FOUNDRY

A PENTON PUBLICATION
OCTOBER 1955

OCT 1955
DETROIT

SHELL MOLDING AT LYNCHBURG

— page 102

SHELL MOLDING AT LYNCHBURG

ZIRCON SAND offers several advantages as a molding medium in the production of large steel castings — p. 126

MELTING FURNACES should be selected by the brass foundry according to its specific requirements — p. 119

COMBINED CARBON content is an important indication of an iron's structure. Here's how to determine it — p. 132

PURITE saves money 8 ways

1. Purite produces higher percentages of finished castings—fewer rejects per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola —100% desulphurizing action in the ladle.
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Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.

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Put the brakes on heat-checking

...or how Chuck Wright "beat the drum" for increased strength

"Ever watch a heavily-loaded truck and trailer combo slither down a steep long road?" asked Chuck Wright.

"One look," the INCO distributor foundry specialist continued, "tells why brake drums on heavy trucks can get red hot.

"Some months ago, Bruce Benson, superintendent of the Lenox Foundry, wired me to come on the double. He'd been pouring brake drums for years. Lenox drums . . . typical medium grade iron of some 3.30 carbon, 1.80 silicon and a little alloy . . . gave good, long service on light trucks.

"Bruce couldn't account for the failures that followed his use of the same iron in thicker, larger drums for heavy-duty vehicles. Particularly since his foundry practices were the best.

"Failure of the drums resulted from heat-checking, I explained to Bruce. Because on heavy-duty trucks, brake drums sometimes get red hot. At these temperatures the iron goes through what metallurgists call the *critical range* . . . where a sudden contraction of the expanding metal takes place. Repeated cycles of this cause heat-checking of the drum surface. Eventually, it becomes so rough that the shoe is chewed up and the brake fails. In fact, the drum casting may even crack in two.

"But you can combat heat-checking, as I told Bruce, by using a high graphite iron, carbon at least 3.60%. This amount allows the metal some leeway as it expands and contracts. At the same time, to keep a balanced iron, silicon should be reduced to a maximum of 1.40%.

"Reducing silicon will give the iron a tendency to develop chills and brittleness. However, you can curb this trend by adding 2% nickel.

"Although such a composition will answer the heat-checking problem, it won't provide high enough tensile for heavy-duty service. So you add 0.35% to 0.50% each of molybdenum and chromium. The additions of moly and chrome help to develop not only proper strength but they also help to lessen the expansion-contraction rate of the iron in the *critical range*.

"Those were my suggestions to Bruce Benson, and he followed them.

"Since then, Lenox heavy-duty drums have come through every sort of test in the lab and on the road with colors flying. Warping is minimized, and the drums not only resist wear, but also keep their uniform round shape.

"Don't wait until a customer complains before calling me for help. When you need some practical answers, where the metallurgy of castings is involved, I'm your man. And the easiest way to reach me is through INCO."

Chuck Wright

The International Nickel Company, Inc.

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TRADE MARK

FEDERAL GREEN BOND . . . THE PURE BENTONITE

specially selected and prepared for foundry use only

Back in 1925, bentonite was *first* developed, by FEDERAL, as an admix to molding and core sands. FEDERAL GREEN BOND was introduced at that time as *pure* bentonite of the highest quality, specially processed for foundry use. It's been just that ever since—unadulterated, untreated, free of chemicals or other ingredients detrimental to foundry sands or conditions. There are other reasons, too, for its superiority as a sand additive, such as:

FEDERAL *guarantees* that GREEN BOND will produce the *highest* green and dry bond strength of any of the western bentonites.

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FEDERAL GREEN BOND has a pH value of 9.0

FEDERAL GREEN BOND lasts and lasts—retaining its bonding efficiency much longer than any other bonding agent.

FEDERAL GREEN BOND induces exceptionally high permeability, permitting the use of fine sands for better casting finish.

FEDERAL GREEN BOND contributes materially to the production of castings that are free of defects—castings that require much less cleaning—castings that look good and bring higher prices.

FEDERAL controls every phase of the production of GREEN BOND, from mining and processing to sales and technical service.

FEDERAL GREEN BOND is carried in stock in FEDERAL warehouses in principal cities in the U. S., Canada, British Isles and Continental Europe. It is available in *three* convenient forms: (1) PULVERIZED—for general foundry use as a dry additive, for core and molding sand. (2) GB-100 FINE GRANULAR—a dry additive with low dust content, for core and molding sand. (3) No. 1200 SLURRY GRADE GRANULAR—for use as a wet additive.

IMPORTANT!

Here's an essential point to remember, when selecting your source for bentonite . . . FEDERAL GREEN BOND is sold and serviced by FEDERAL's own trained, technical service engineers! FEDERAL's interest in your use of its products doesn't stop at the time of sale, but continues beyond, in the form of technical service and assistance.

Next time you buy bentonite—try FEDERAL GREEN BOND! You'll soon learn why it's known everywhere as the "BEST OF THE BENTONITES!".

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FOUNDRY

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October 1955

Volume 83—Number 10

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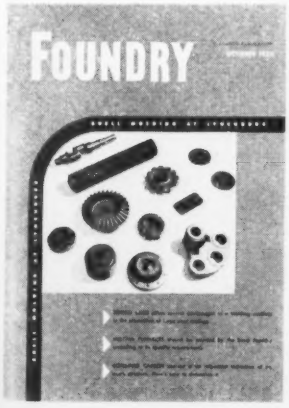

THE COVER: Typical shell mold castings as produced at the new shell mold foundry of the Lynchburg Foundry Co., Lynchburg, Va. See detailed story on page 102.

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Gigantic casting by Lynchburg Foundry Co

Moving out of Radford, Va., on its way to Baldwin-Lima-Hamilton Corporation is one of the largest castings in current production at the Radford Plant of the famous Lynchburg Foundry Company.

Weighing 26 tons and measuring 9 ft. x 6½ ft. x 17 ft., this block of cast iron will go into service as an upright for a huge press.

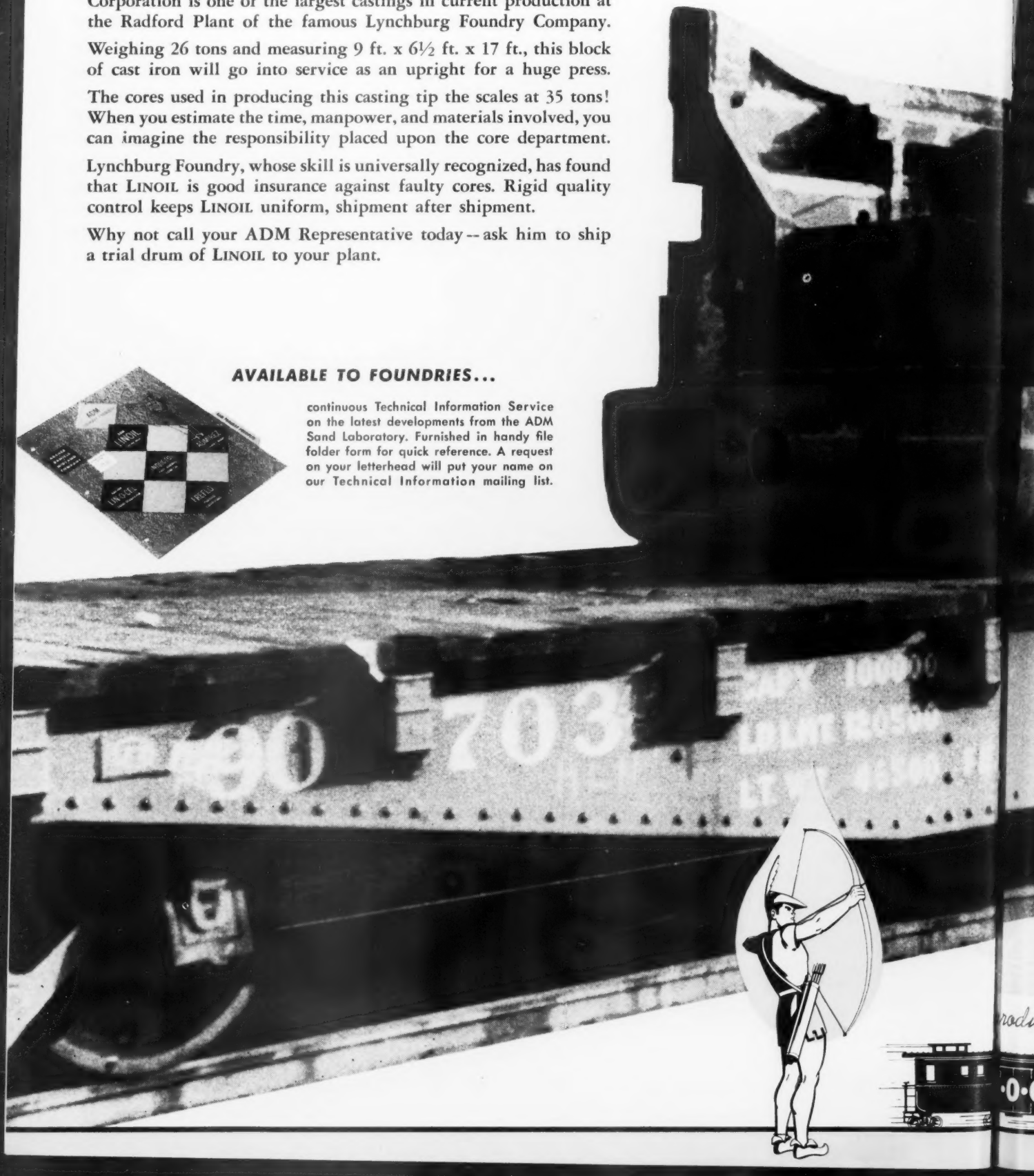
The cores used in producing this casting tip the scales at 35 tons! When you estimate the time, manpower, and materials involved, you can imagine the responsibility placed upon the core department.

Lynchburg Foundry, whose skill is universally recognized, has found that LINOIL is good insurance against faulty cores. Rigid quality control keeps LINOIL uniform, shipment after shipment.

Why not call your ADM Representative today -- ask him to ship a trial drum of LINOIL to your plant.

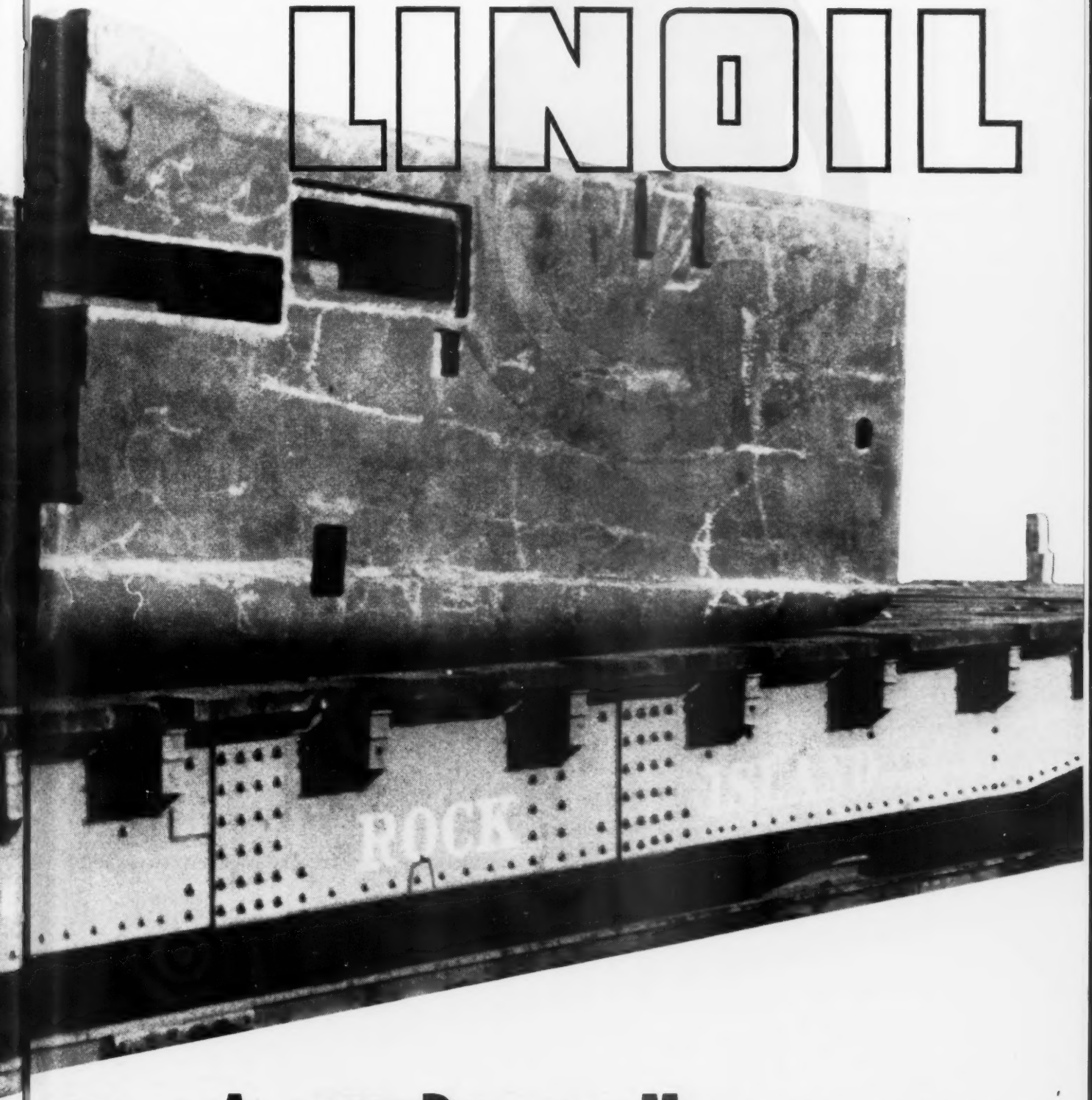
AVAILABLE TO FOUNDRIES...

continuous Technical Information Service on the latest developments from the ADM Sand Laboratory. Furnished in handy file folder form for quick reference. A request on your letterhead will put your name on our Technical Information mailing list.



y Co. takes 118 gallons of

LINOIL



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AMASTEEL

to be the superior abrasive.

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High-strength shell, bonded with Resinox 736, is stripped from the pattern plate.

This foundry gets stronger, non-warping molds with **Resinox 736**

MONSANTO PHENOLIC RESIN SELECTED BY LYNCHBURG FOUNDRY AFTER INTENSIVE LABORATORY TESTING

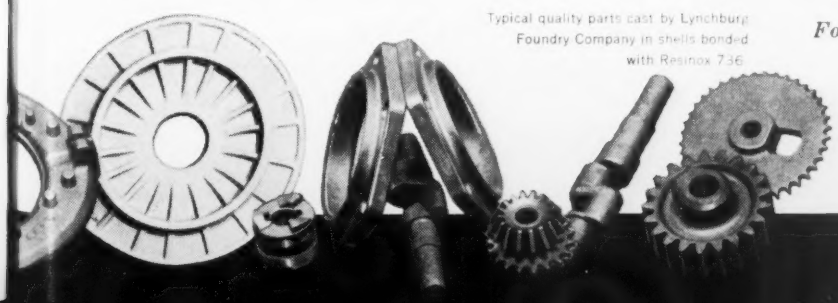
"Resinox 736 has proved itself to have the characteristics needed to meet our exacting shell molding requirements," according to Harvey E. Henderson, research metallurgist of the Lynchburg Foundry Company, Lynchburg, Va.

This Monsanto resin, which was developed specifically for precision shell casting, has also enabled Lynchburg Foundry to reduce the problem of warped shells.

Resinox 736 also has the hot strength necessary to prevent metal from penetrating into the mold. This holds finish-grinding of castings to a minimum.

"With the Monsanto material, we are now getting castings with excellent surface. They are exceptionally clean, good looking and uniform," Mr. Henderson states. "This good finish plays a vital part in obtaining the close dimensional tolerances needed, and has greater sales appeal with our customers."

Lynchburg is one of a long list of foundries in which Monsanto resins are giving outstanding performance. For shell molding, core binding or sand conditioning resins that are research-developed and shop-tested to meet *your* foundry needs, write first to Monsanto Chemical Company, Plastics Division, Dept. FO-10. Springfield 2, Mass.



Typical quality parts cast by Lynchburg Foundry Company in shells bonded with Resinox 736

For stronger shell molds, specify

RESINOX®

MONSANTO®

CUT CORE-MAKING 6 COSTS WAYS by the CO_2 Process

using STEINEX BINDER *and* HANSBERG CORESHOOTERS

1 ARE LARGE CORES A PRODUCTION BOTTLE-NECK IN YOUR OVENS?
You can now cut costs by hardening these cores in a few seconds by this CO_2 process.

2 Eliminates drying ovens and their maintenance. Saves fuel and labor costs. GREATLY SPEEDS CORE-MAKING.

3 No waiting, no storage of cores necessary — cores hardened in the core box can be used immediately. Save a whole day's time on rush orders.

4 Nails, gaggers and wires are practically eliminated since core hardens right in corebox.

5 Because of the greatly improved accuracy with this method, casting tolerances may be held to a few thousandths of an inch.

6 Facing very large molds with Steinex Sand eliminates necessity of oven drying.

HANSBERG CORESHOOTER

Here is an entirely new type of core-making and shell-molding machine. It incorporates a new fundamental principle referred to as the "SHOOT." Uses very little compressed air. Economical for mass production and SHORT RUNS AS WELL. Incredibly fast production time is assured.

STEINEX BINDER

STEINEX is a remarkable core sand binder. Cores and shell molds, made of core sand mixed with STEINEX, can be hardened in a few seconds by the injection of carbon dioxide.

These cores and molds may be cast IMMEDIATELY.

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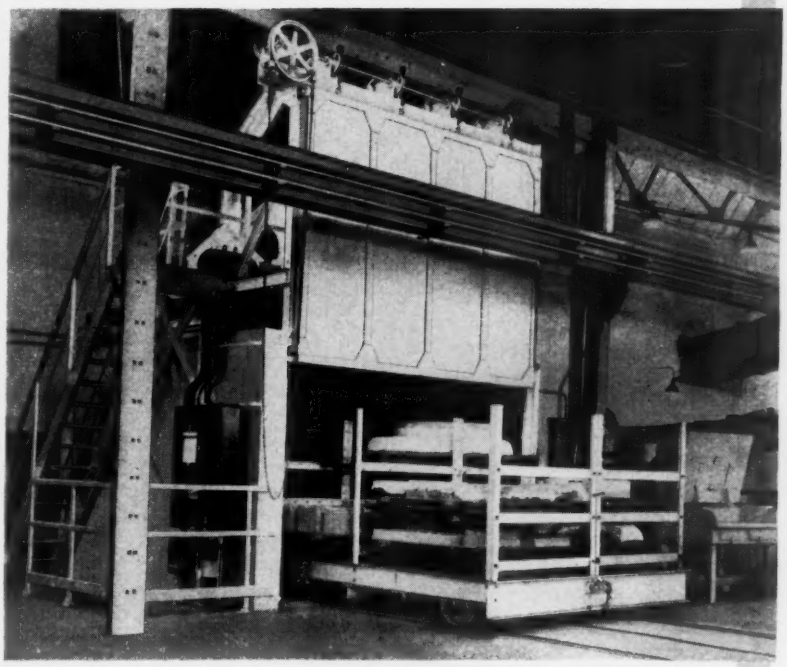
Performance records prove

COLEMAN OVENS
reduce foundry costs



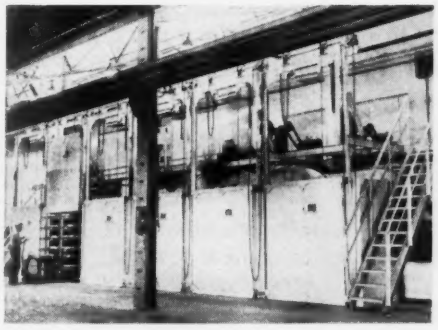
Coleman Car-Type Oven

Coleman Core and Mold Ovens reduce foundry costs by producing more efficiently . . . more dependably . . . year after year. They are as fine as modern engineering can make them because they are the result of *MORE THAN A HALF A CENTURY* of specialized foundry oven experience.

Statements like these from foundrymen everywhere prove that Coleman Ovens are vital to more profitable operations:—

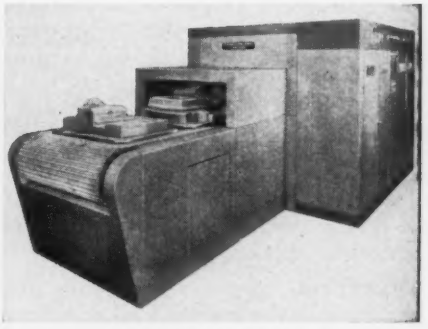
". . . we are getting smoother castings and a reduction of our scrap casting losses." — ". . . we are able to turn out 25% more cores with the same amount of labor." — "We have perfectly dried molds everytime." — "It saved us a lot of money and headaches" — "the resultant cores are more uniformly baked and our entire operation is more economical."

Actual performance records prove that Coleman Ovens may reduce overall core department costs by as much as 50%! Such savings mean increased profits and rapid amortization of investment. Many Coleman Ovens have paid for themselves in less than a year!



Coleman Transrack Ovens

Coleman Tower® Oven



Coleman Dielectric Oven

With production savings so important to profits, it will pay you to investigate the unusual advantages of Coleman Ovens now! For better castings at lower cost let our experienced Engineers give you practical recommendations for your particular requirements.

AS BUILDERS OF THE WORLD'S ONLY COMPLETE LINE OF FOUNDRY OVENS, WE HAVE NO REASON TO RECOMMEND ANY BUT THE BEST OVEN SUITED TO YOUR PURPOSE.

THE FOUNDRY EQUIPMENT COMPANY
1831 COLUMBUS ROAD **CLEVELAND 13, OHIO**

WRITE FOR BULLETIN 54

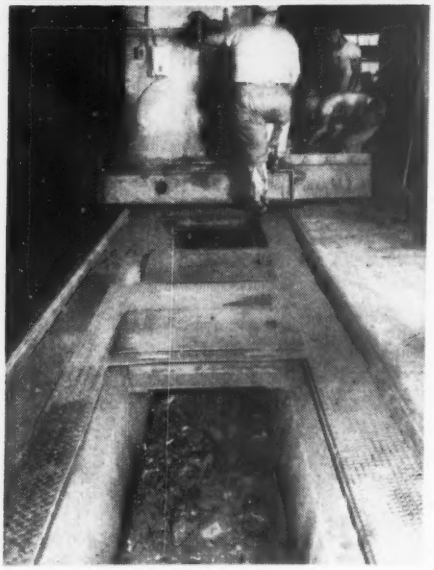
A COMPLETE RANGE OF TYPES AND SIZES . . .

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

This foundry
DOUBLED BELT LIFE
by switching to
IMPERIAL



Long-wearing Imperial Belting gives maximum economy

Sand and metal with temperatures up to 500° F. drop directly on an Imperial Stitched Canvas Super Insulated Sahara Conveyor Belt used in the foundry of Empire Steel Castings.

That's rugged service . . . with the belt subject to damage by tearing, heat, impact and abrasion. Yet the Imperial Belt used (217' x 24" x 6 ply, with armored reinforcement) has been in operation 24 hours a day since January, 1954. This is double the life of belting used previously, the foundry operators report.

Imperial Sahara Belting is job-designed to outwear any other belting made for foundry service . . . and thus give lowest ultimate belting cost. Write for informative Data Sheet 54-2 and describe your belting needs.

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You expect MORE from Imperial . . . and you get MORE!

With the EDITORS

SHELL Molding at Lynchburg: Bob Herrmann's excellent report on the new Lynchburg operation emphasizes again the growth in the shell molding process for manufacturing castings. In addition to the equipment required to produce shell molds, this new facility includes all the other equipment necessary for a complete foundry. I feel that many readers will find this report quite interesting.

Several organizations and individuals have aided materially in the development of this article. Management of Lynchburg very kindly told the editors of their plans for a shell mold foundry in the early stages of the project, and kept us abreast with progress. Special thanks should go to Lloyd McNeill, general manager of the company, for his kind co-operation, and to Marcus C. Elcan Jr., editor of *The Iron Worker* published by Lynchburg, for taking the photographs used to illustrate the article.

Irving E. Ingraham of Giffels & Vallet Inc., Detroit, was especially helpful in supplying layout drawings included with the article and the photograph of a variety of Lynchburg shell molded castings reproduced on the cover of this issue.

—o—

November Feature: Dave Gibbs, manager of market research and promotion, has been busy collecting and tabulating data from the survey on material handling in the foundry industry and Managing Editor Bill Gude now is preparing the data for publication in the November issue. When completed this study will reveal the progress of many foundries in mechanizing the various foundry operations which require the handling of materials.

—o—

Powerama: During most of September, General Motors staged a mammoth exposition on Chicago's lakefront to tell the story of power, especially that supplied by the diesel and gas turbine engines. I saw the preview and found the entire affair interesting, stimulating and instructive.

Foundrymen going through the show probably were interested in observing the extensive use of castings in the many types of equipment produced by GM. Judging by the lines that quickly formed at the Fabricast exhibit, the general public as well as foundrymen found the casting of metals an exciting operation. That exhibit featured an operating foundry where an aluminum crankcase inspection cover was cast in a permanent mold. A die casting machine also was in operation producing a souvenir for a key chain. The exhibit included a display of a variety of castings produced by Fabricast and a series of models to show the production of both sand and investment castings.

The people in the Chicago area are having a treat. I hope this tremendous show eventually may be seen in other metropolitan centers throughout the country.

—o—

Machine Tool Show: The metalworking industry had a good look at the tools of the future at Chicago from Sept. 7 to 17, and evidently liked what it saw. Tremendous developments in new and improved machines of all types, automatic controls and the extension of automation were outstanding features of the tremendous Machine Tool Show. I was particularly struck with the fact that the 1955 machine tool show represented the greatest collection of excellent castings ever assembled under one roof. While there has been much competition in the field, the fact remains that castings continue to be the principal component in most machine tools. In fact, the tools that looked modern and carried the impression of efficiency, accuracy, stability and long life were constructed chiefly of castings.

The foundry industry should be proud of the products that were on display.

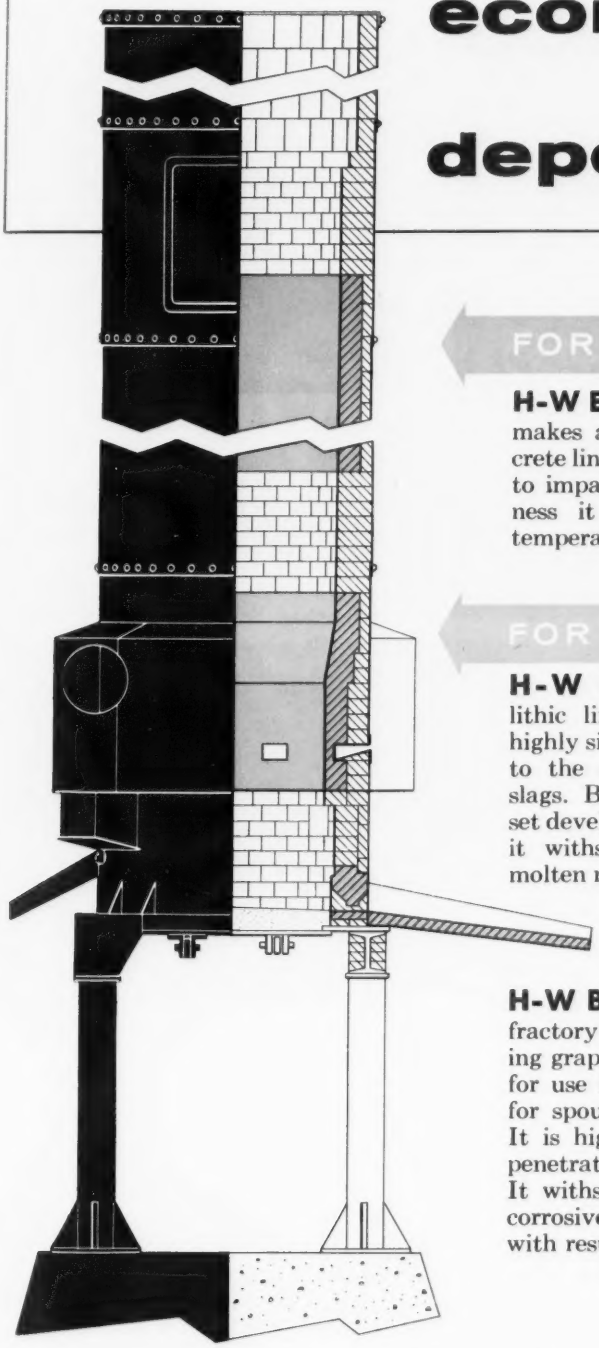
—o—

Automatic Machine: One piece of foundry equipment made an appearance at the Machine Tool Show. The W. F. & John Barnes Co., Rockford, Ill., had a small model of a rotary indexing molding machine which has been under development for some time and probably will be introduced in the future. The machine is designed with six stations for a production of 120 molds an hour.

—o—

Appreciation: The Wheelabrator Corp., Mishawaka, Ind., is one of the companies recently awarded a Certificate of Appreciation by the Navy for co-operation in giving employees military leave to go on summer training cruises and other training duty. The illustration shows Commander

Harbison-Walker *Monolithic* cupola linings **economical** to install and maintain . . . **dependable** in service . . .



FOR THE CHARGING ZONE

H-W Extra Strength Castable makes a hard, strong refractory concrete lining which is extremely resistant to impact and abrasion. In refractoriness it is adequate for service at temperatures up to 2400°F.

FOR THE MELTING ZONE

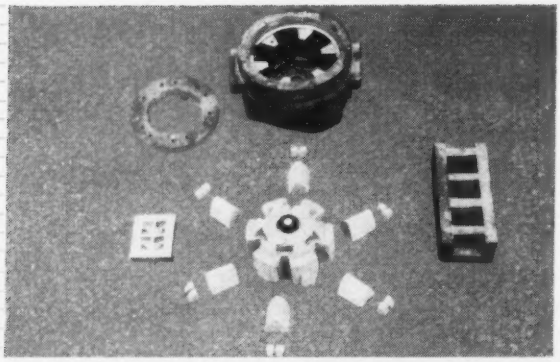
H-W Kuplomix provides monolithic linings free from joints. It is highly siliceous and extremely resistant to the corrosive action of non-basic slags. Because of the strong ceramic set developed at working temperatures, it withstands the erosive action of molten metal and slag to a high degree.

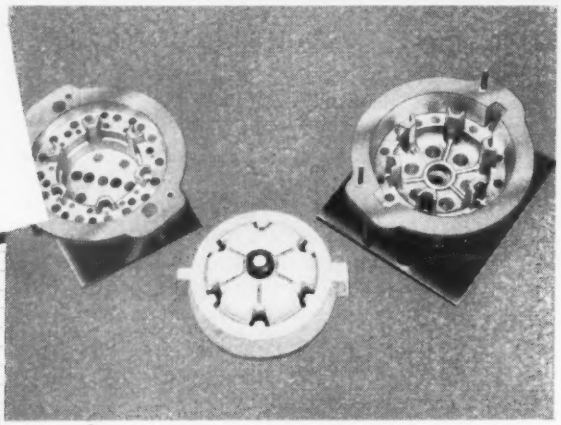
FOR THE BOTTOM ZONE

H-W Black Patch is a plastic refractory of super-duty quality containing graphite, which is especially suited for use in the cupola breast wall and for spouts, runners and ladle linings. It is highly resistant to wetting and penetration by molten iron and slags. It withstands the severe erosive and corrosive action of metals and slags with resultant longer service life.

In addition to the above, Harbison-Walker products include all classes of commercial refractories for every foundry requirement.

HARBISON-WALKER REFRACTORIES CO.
AND SUBSIDIARIES
World's Largest Producer of Refractories
GENERAL OFFICES: PITTSBURGH 22, PENNA.





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WITH A

Well-Made PATTERN

This may be simple arithmetic but it didn't seem so to one of our customers. When he brought this job to us, it required thirteen cores.

Our pattern engineers suggested a design change in the casting which eliminated six cores. The remaining seven cores were then easily combined, substituting one pattern and one core for the original thirteen.

The result was an immediate production increase and cost reduction by eliminating extra work in the core room, tedious fitting on the molding floor and excessive flashing removal after the casting was made.

An unusual case? Not particularly. Because of our long experience in the pattern business as well as the foundry business, our pattern engineers look at every job with a practical eye. Our patterns are Well-Made not only to meet blue print specifications, but also to function efficiently when translated into sand and hot metal on the mold floor.

For complete information write for Catalog 53.

Well-Cast MAGNESIUM, ALUMINUM AND BRONZE CASTINGS

Well-Made WOOD AND METAL PATTERNS

THE WELLMAN BRONZE & ALUMINUM CO.

Dept. 7, 12800 Shaker Boulevard Cleveland 20, Ohio

I. E. Ayer, commanding officer, U. S. Naval and Marine Corps Training Center, South Bend, Ind., (left) presenting the certificate to Otto A. Pfaff, president and general manager, Wheelabrator Corp. (right). Lt. Commander R. E. Gibson (center) commanding officer of a Naval Re-

serve Surface Division, South Bend, looks on. Lt. Commander Gibson is a Wheelabrator sales engineer.

The company can place this alongside the Army-Navy "E" pennant received during the war.

—o—

Changing Seasons: As in recent years, this has been written on the shore of a small lake in northern Indiana. The vacation has been very pleasant and restful. But Labor Day has just passed and for the last two days a feeling of fall has been in the air. It is surprising how fast nature is changing her dress and how quickly the birds are preparing for the migration. Of course, these happenings bring forth the comment from the weather prophets that it will be an early frost. Guess we will have to wait and see.

—o—

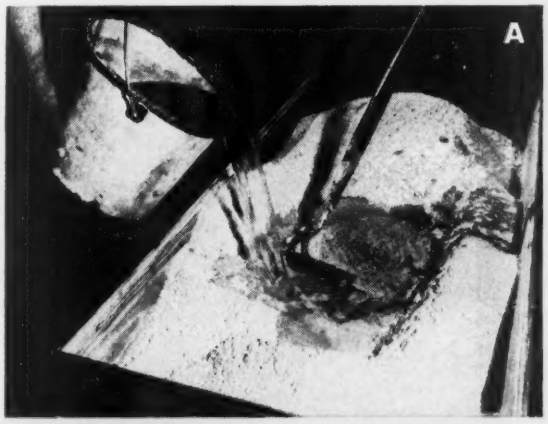
The Meeting Circuit: But the vacation is practically over. Tomorrow I will go to Chicago for the Machine Tool show and then the fall traveling schedule for the editorial staff will get under way. Foundrymen, being the meetingest folks in our industrial life, have scheduled all kinds of meetings this fall, in addition to the chapter and local group affairs. FOUNDRY editors will attend most of the annual, fall and regional meetings to be staged during the next three months, and will prepare reports of what happens for presentation in the editorial pages of future issues.

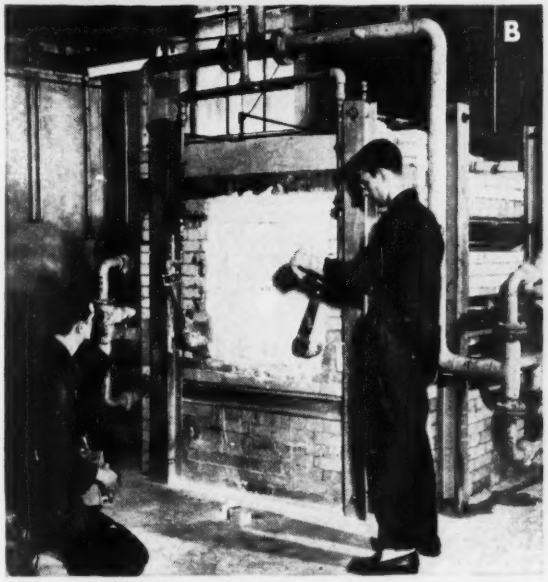
That part of meeting attendance is the chore. The real pleasure comes from meeting and talking with you —learning what is going on in this fine old industry which serves our modern civilization so well.

So some of us will be seeing you shortly.

F.G.S.

NEW B&W 3200 degree Refractory Concrete





Today, in some types of heating and melting furnaces, complete linings or sections of linings are subjected to temperatures over 3000 F and, with the trend to higher and higher operating temperatures, the problem of finding the most economical refractories for this "over 3000 F service" will become even more important.

Now, with B&W's new Refractory Castable-3200, furnace builders and operators can cut installation costs by using castable construction for services up to 3200 F. As easy to use as other B&W refractory concretes, B&W Refractory Castable-3200 can be poured or trowelled into place or applied with a cement gun.

Several years ago, B&W developed Kaocast, the first successful 3000 degree refractory concrete, to lead this high temperature castable trend. B&W Castable-3200, like Kaocast, is made with an alumina-silica base and is recommended for temperatures from 2600 to 3200 F. Because of its very high temperature properties, it is not recommended for temperatures below 2600 F.

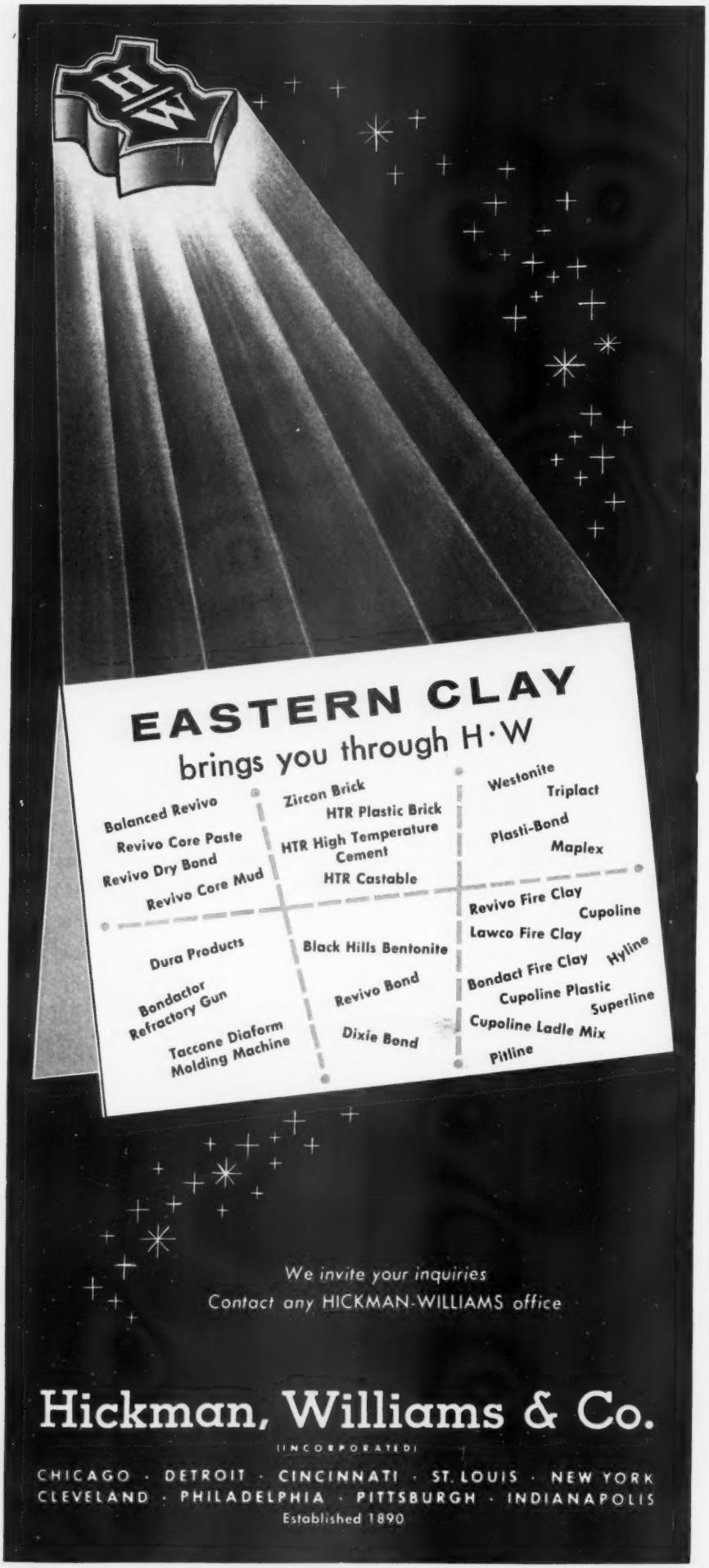
If you have not taken advantage of the fast, low cost installation of castables for your high temperature requirements, we suggest you investigate B&W Kaocast and the new B&W Castable-3200. Your local B&W Refractories Engineer has all the facts.

A Mixed like structural concrete, B&W Refractory Castable-3200 can be poured, trowelled or gunned into place. • **B** High temperature laboratory furnace lined with B&W Refractory Castable-3200.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick
B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars
OTHER B&W PRODUCTS: Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units • Seamless & Welded Tubes • Pulverizers • Fuel Burning Equipment
Pressure Vessels • Alloy Castings

BABCOCK & WILCOX
THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES 161 EAST 42ND ST. NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

B-830



CALENDAR of Meetings

Oct. 6-7—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Oct. 13-15—Committee on Vacuum Techniques Inc., symposium on vacuum technology, Mellon Institute, Pittsburgh.

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 14-15—New England Foundrymen's Association, Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 14-16—Northwest Regional Foundry Conference, Portland, Oreg.

Oct. 16-18—Conveyor Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—American Coke & Coal Chemicals Institute, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, national metal exposition and congress, Convention Hall, Philadelphia.

Oct. 17-21—National Safety Council, national safety congress and exposition, Conrad Hilton, Congress, Morrison and LaSalle Hotels, Chicago.

Oct. 19-21—Gray Iron Founders' Society, annual meeting, Schroeder Hotel, Milwaukee.

Oct. 20-21—National Noise Abatement symposium, Armour Research Foundation, Illinois Institute of Technology, Chicago.

Oct. 20-21—Ohio Regional Foundry Conference, sponsored by Ohio AFS chapters, Case Institute of Technology, Cleveland.

Oct. 24-25—Steel Founders' Society of America, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 31-Nov. 1—Magnesium Association, annual meeting, Biltmore Hotel, New York.

Nov. 1-3—Investment Casting Institute, fall meeting, Sheraton-Cadillac Hotel, Detroit.

Nov. 1-3—Grinding Wheel Institute and Abrasive Grain Association, fall meeting, Statler Hotel, Buffalo.

Nov. 3-4—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 9-11—Industrial Management Society, annual time and motion study and management clinic, Sherman Hotel, Chicago.

Nov. 13-18—American Society of Mechanical Engineers, 75th annual meeting, Congress, Conrad Hilton and Sheraton-Blackstone Hotels, Chicago.

Nov. 14-16—National Metal Trades Association, annual convention, Hotel Commodore, New York.

Nov. 16-18—Steel Founders' Society, annual Technical and Operating Conference, Hotel Carter, Cleveland.

Nov. 16-19—Society for Experimental Stress Analysis, annual meeting and exhibit, Sherman Hotel, Chicago.

Dec. 1-2—Michigan Regional Foundry Conference, Michigan State University, East Lansing, Mich.

Dec. 7-9—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh.

1956

Jan. 23-26—Plant Maintenance & Engineering Show, Convention Hall, Philadelphia. Plant maintenance and engineering conference will be held concurrently with the show.

Feb. 9-10—Wisconsin Regional Foundry Conference, Hotel Schroeder, Milwaukee.

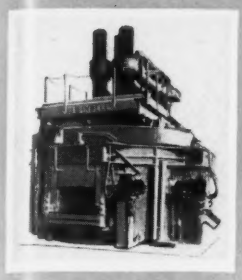
Feb. 16-17—Southeastern Regional Foundry Conference, sponsored by Birmingham and Tennessee Chapters, AFS, Tutwiler Hotel, Birmingham.

Mar. 7-8—Foundry Educational Foundation, college-industry conference, Hotel Cleveland, Cleveland.

Mar. 19-20—Steel Founders' Society, annual meeting, Drake Hotel, Chicago.

May 3-9—American Foundrymen's Society, annual convention and exhibition, Convention Hall, Atlantic City, N. J.

• ONE OF A SERIES OF MESSAGES TO MODERN FOUNDRY MANAGEMENT



SWINDELL

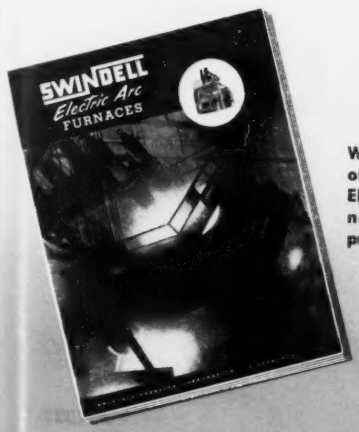
SINCE 1850

FOUNDRY ELECTRIC MELTING FURNACES

REMOTE CONTROLLED ELECTRODE HOLDERS

—another SWINDELL quality feature

Swindell Electric Melting Furnaces for foundry service provide the productivity, low maintenance and long useful life built-in by genuine steel mill design and construction by steel mill melting furnace specialists. Write for a consultation.



WRITE for your copy of the latest Swindell Electric Melting Furnace Catalog—sent promptly on request.

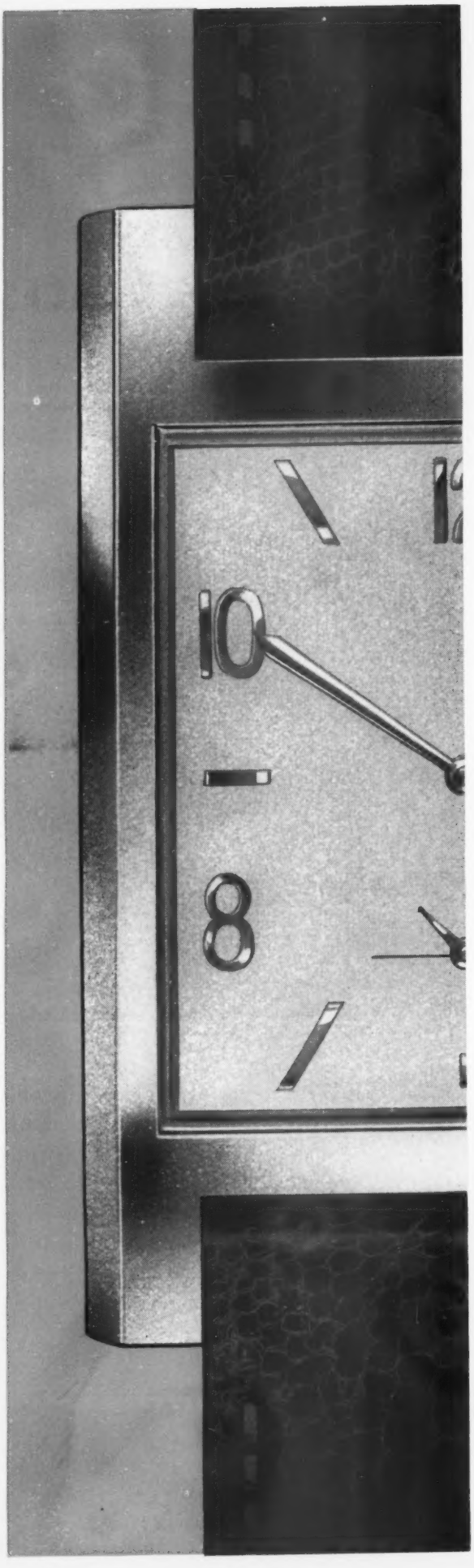
SWINDELL electrode holders are remote-controlled from a floor position—with safety and convenience. The operating mechanism is simple and sturdy, eliminating interruptions to the melting cycle. In every respect, Swindell engineering produces crossheads, electrode arms and holder assemblies that function with smoothness, ease and dependability—measures of *quality* in exacting service.

SWINDELL-DRESSLER

CORPORATION

Designers and Builders of Modern Industrial Furnaces

PITTSBURGH 30, PA.



How to

really cut snagging time

in your cleaning room!

switch to

CINCINNATI PD SNAGGING WHEELS

Every minute of wasted snagging time is cutting into your profits. You can save time—and save money—with CINCINNATI (PD) SNAGGING WHEELS, the greatest grinding wheel development in years.

Foundries all across the nation report that CINCINNATI (PD) WHEELS cut snagging time in their cleaning rooms and save money these four important ways:

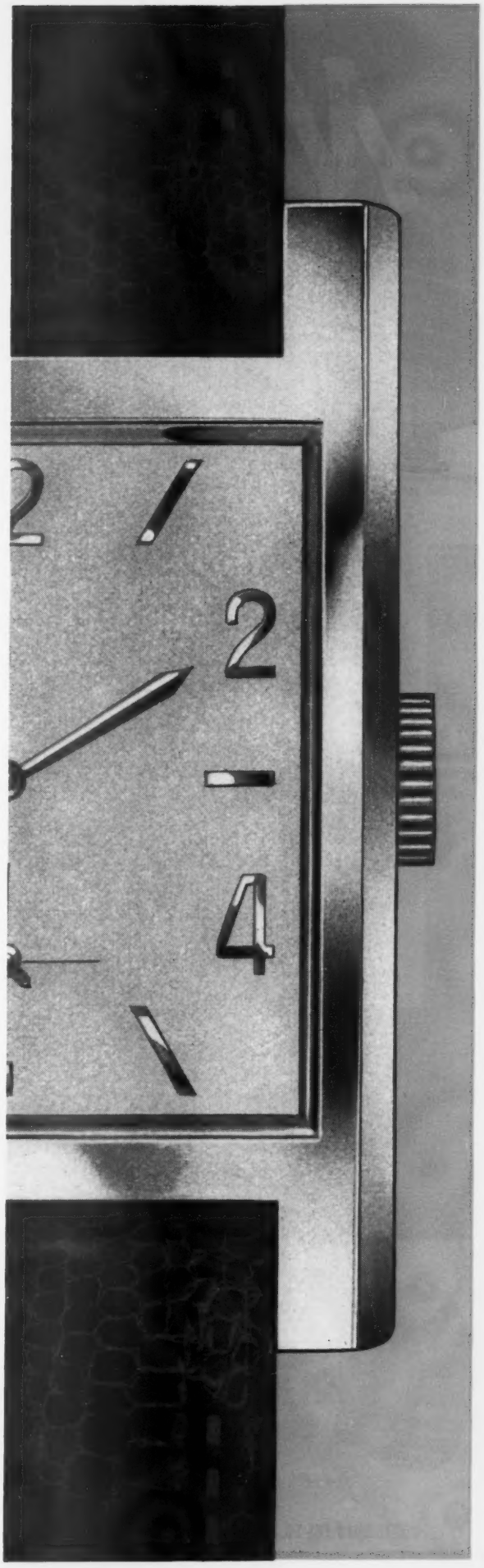
- FREER CUTTING—You can get more pounds of metal per hour with the grains and bonds specified by CINCINNATI for your jobs. Operators like the fast, easy cutting action of CINCINNATI (PD) WHEELS.
- SELF - DRESSING ACTION—The CINCINNATI (PD) WHEELS specified by CINCINNATI abrasive engineers require few, if any, dressings. With the right grade wheel, new cutting grits are bared as soon as old grits get dull and inefficient.
- LONGER WHEEL LIFE—Through longer life of CINCINNATI (PD) WHEELS, users have reported almost *double* the production per wheel. One customer, using a portable grinder, gets almost twice the life with a CINCINNATI (PD) Flared Cup. Another user, snagging cylinder blocks on a swing frame, has increased the production per wheel 45% with (PD) WHEELS.
- POSITIVE DUPLICATION (PD)—"On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *Yet these better, cost-cutting* CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

We'll be happy to prove to you how CINCINNATI (PD) WHEELS can increase your production and cut costs by cutting snagging time in your cleaning room. Just contact us and we'll send one of our representatives. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.



NEW... AMERICAN MONOTRACTOR for Automatic Handling

The NEW American MonoTractor will fit precisely into any overhead handling system for automatic transfer of materials.

This new unit offers these advantages:—

1. Duti-Rated Life Time Gearing.
2. Speed Range from 35 to 350 F. P. M.
3. Horsepower Range for ¼ to 2 H.P.
4. Any Standard NEMA Motor.
5. Any Type Motor Brake Can Be Applied.
6. Operates on Any Smooth Flat Flange Track.

This precision built tractor unit offers continuous trouble-free transfer of any type of carrier for power propulsion. American MonoRail engineers offer wide experience in the application of these units. Let them help you solve your automatic handling problems.

AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

[IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.]

TIMKEN® bearings save mullor maintenance at ultra-modern foundry

THE 24 mullors at the Ford Motor Company's ultra-modern Cleveland Foundry operate automatically and continuously on a one-minute cycle. The assembly line set-up in this plant makes high dependability and low maintenance *extremely* important. Beardsley & Piper Speedmullors with Timken® tapered roller bearings at vital points meet these requirements.

The Speedmullor's roller shaft takes the main load of the mulling operation. Beardsley & Piper mounted it on Timken bearings. They have high load capacity because they have full *line contact* between rollers and races. Result: More dependable operation.

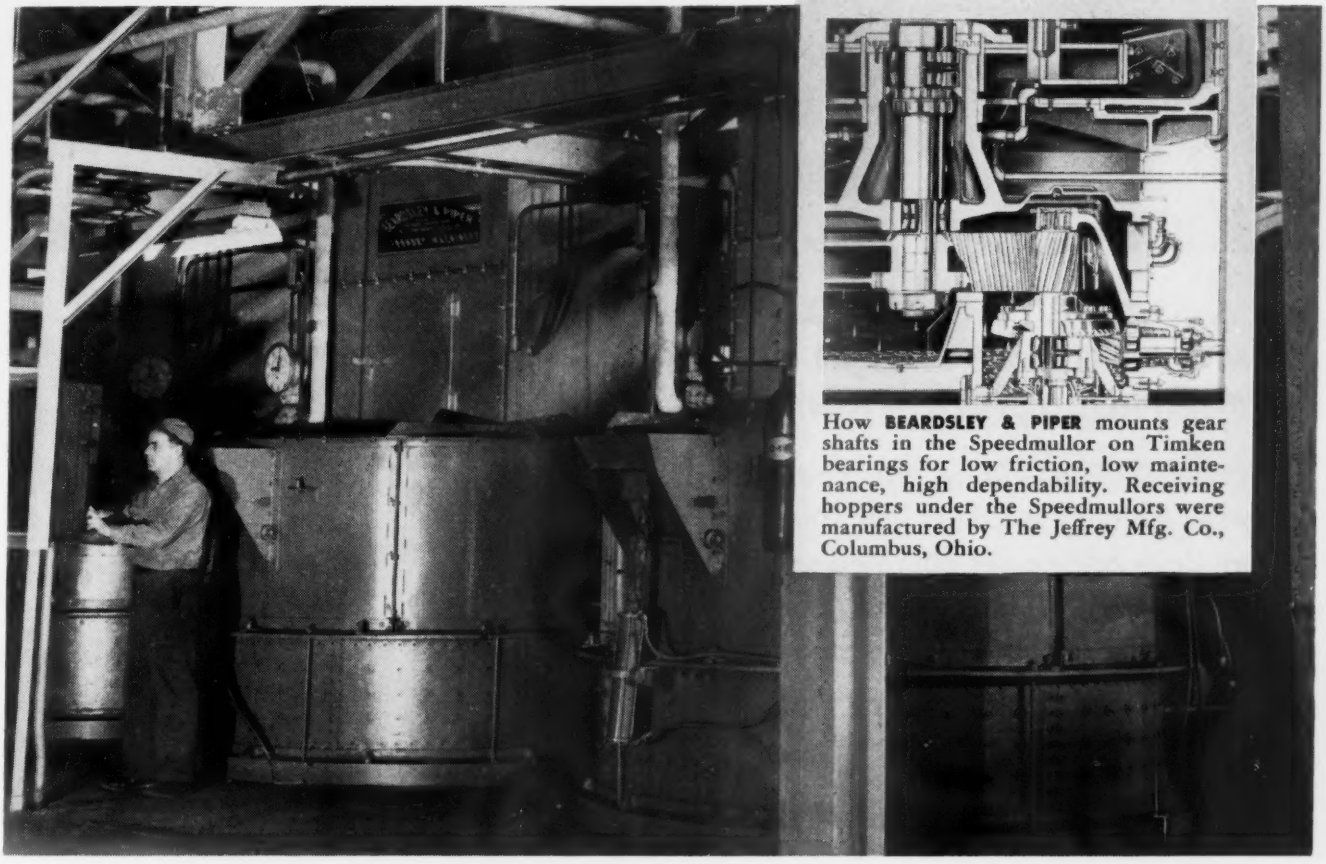
Timken bearings are made to microscopic tolerances so they keep the Speedmullor gear shafts in accurate alignment. This saves gear wear and forestalls the kind of trouble that could mean a costly shutdown.

The Speedmullor's drive shaft and bevel gear shaft are also mounted on Timken bearings. These bearings must take heavy thrust loads as well as radial loads. The taper enables Timken bearings to take any combination of radial and thrust loads and no extra thrust devices are required.

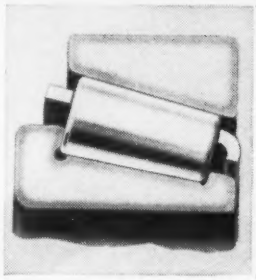
With all the sand and water around these mullors, good bearing closures are important. Timken bearings keep shafts concentric with housings which makes closures more effective.

Timken bearings are a sure sign of quality. When you buy or build machinery, always look for the trademark "Timken" stamped on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



How **BEARDSLEY & PIPER** mounts gear shafts in the Speedmullor on Timken bearings for low friction, low maintenance, high dependability. Receiving hoppers under the Speedmullors were manufactured by The Jeffrey Mfg. Co., Columbus, Ohio.



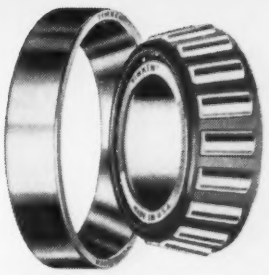
GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer. The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis Timken steels.

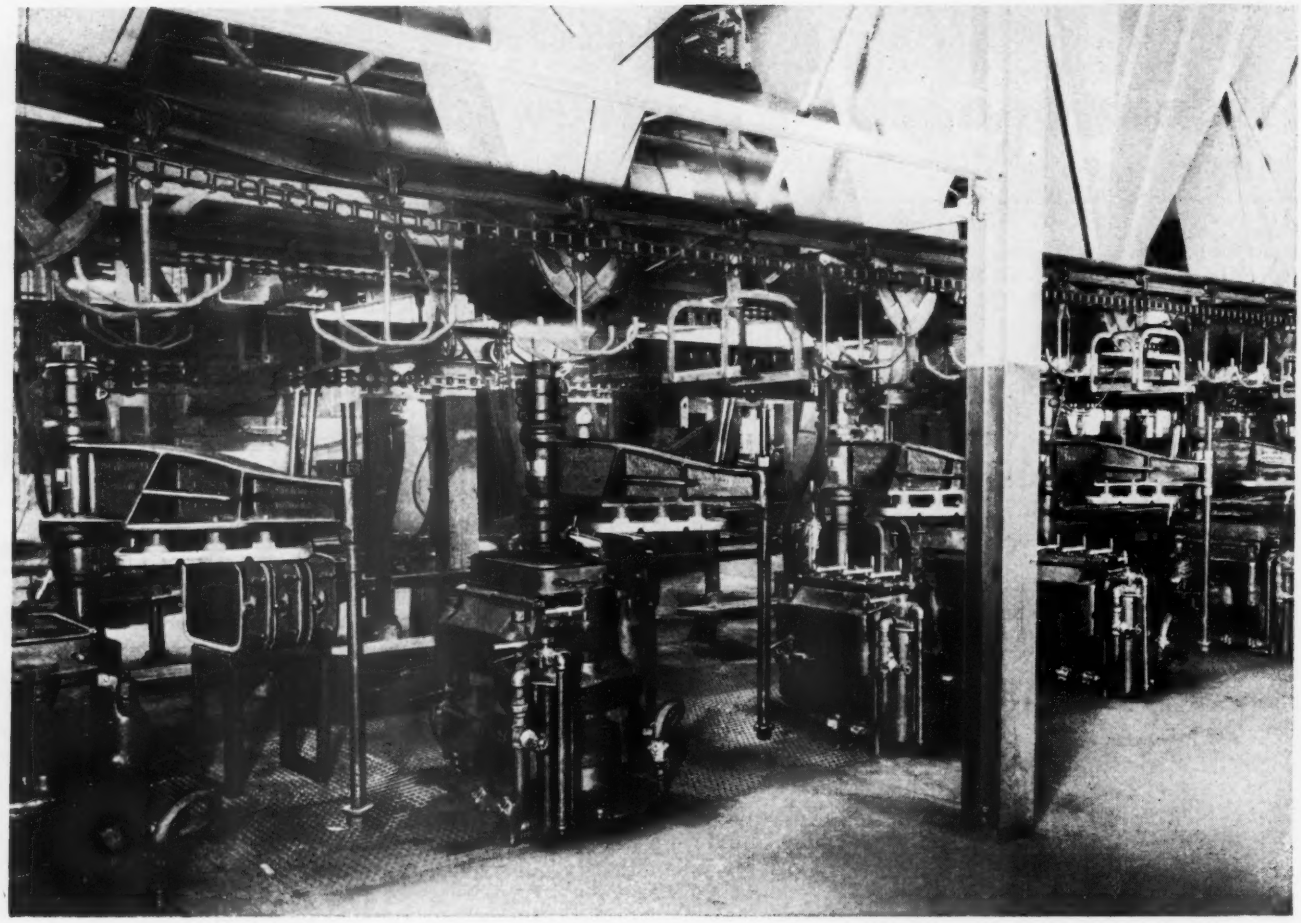
TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

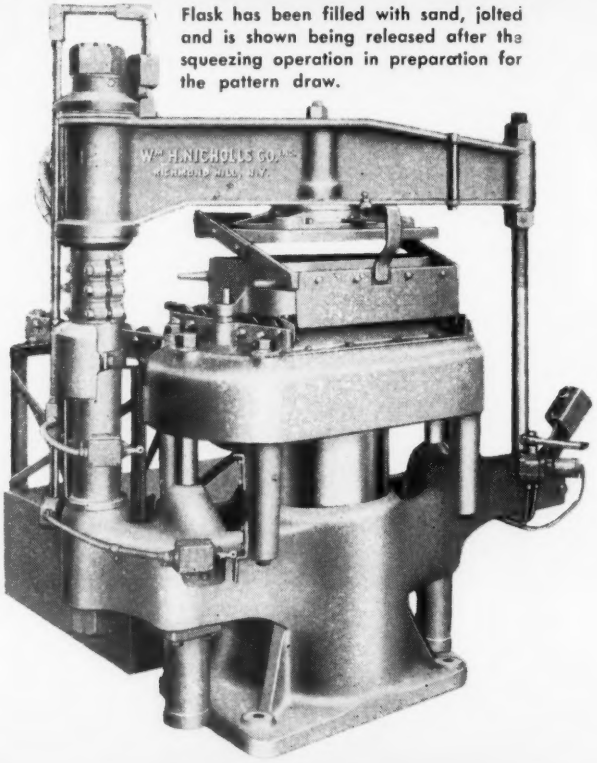


A BATTERY OF NICHOLLS MOLDING MACHINES IN A LARGE PRODUCTION FOUNDRY.

HEAVY DUTY Combination Jolt and Power Squeezer Molding Machines with pneumatic pattern draw and power operated self positioning parallel squeeze head, equipped with electrical controls for single push button automatic operation of jolt, squeeze, pattern draw and cross arm, including automatic sand strike-off, mold pusher and adjustable flask roll-off device.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL 18, LONG ISLAND, NEW YORK

Established 1910



Flask has been filled with sand, jolted and is shown being released after the squeezing operation in preparation for the pattern draw.

NICHOLLS

Memo to foundry superintendents:

Two specific points about Edco Dowmetal Bottom Boards—

✓ 1. the flask side is grooved and vented to permit the escape of gases— insure mold stability.

✓ 2. the opposite side is braced like a bridge— gives you strength without weight for safe, easy handling and long board life.

The entire board, of course, is made of light-weight magnesium.

✓ Write for price schedule, and list of 83 standard sizes —

Christiansen Corporation

210 S. Marion St. · Oak Park 1, Illinois

Edco Dowmetal Bottom Boards · Edco Aluminum Ingot

Make shell molds faster...
get more accurate castings...
with RCI's

FOUNDREZ 7500

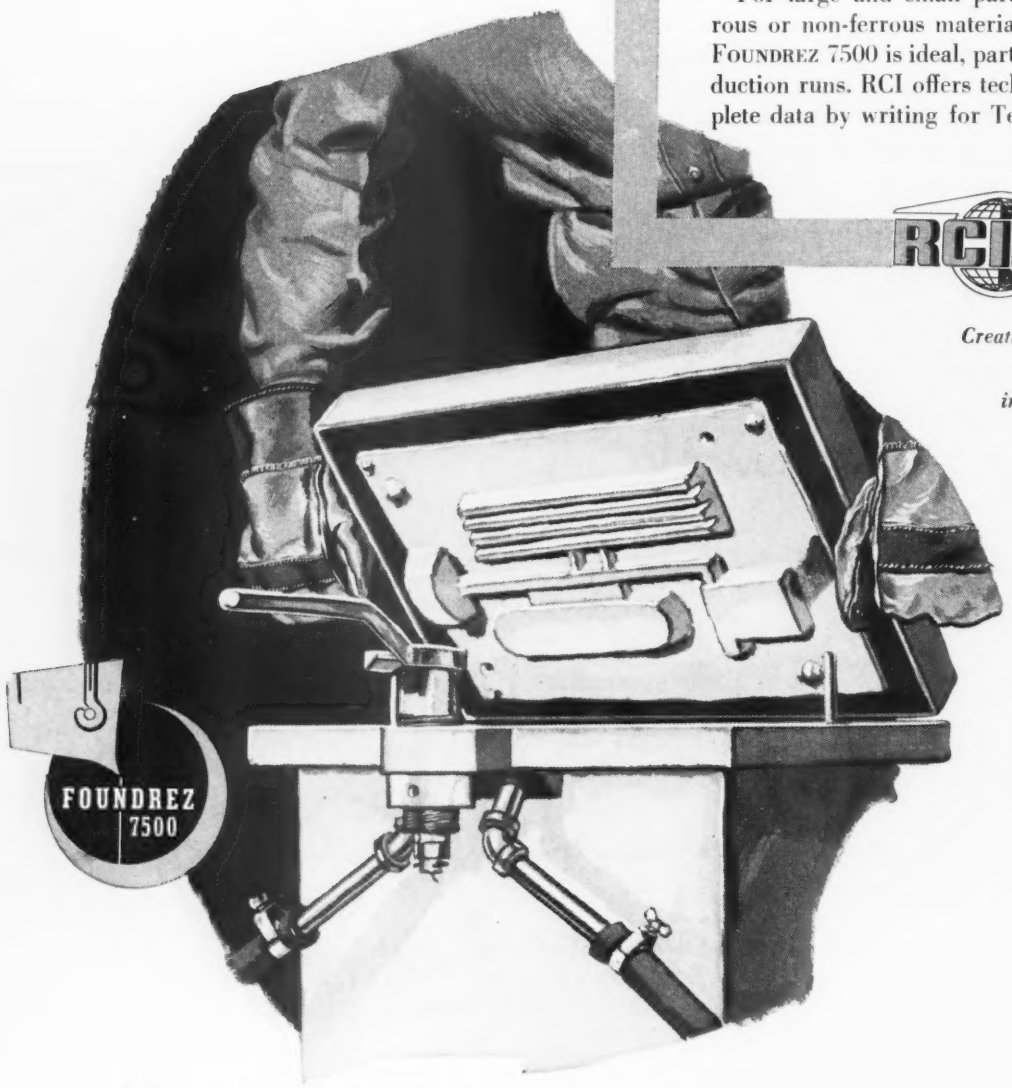
● You save — in *time*, in *labor*, in *materials* — when you make shell-molds with Reichhold's two-stage, thermosetting, powdered phenolic resin — FOUNDREZ 7500. You get castings so accurate that almost no machining is required . . . closely duplicating the actual pattern surface even in the most finely-detailed, thin-walled areas. Rejects are reduced to an absolute minimum.

When you produce shell-molds with FOUNDREZ 7500, curing is *faster*. This remarkable RCI resin takes extremely high oven temperatures, enabling you to turn out more molds per hour . . . molds of uniform superiority. They're structurally stronger, better able to vent gas, freer from distortion.

For large and small parts cast with any ferrous or non-ferrous material, shell-molding with FOUNDREZ 7500 is ideal, particularly for long production runs. RCI offers technical help. Get complete data by writing for Technical Bulletin F-3.

RCI

Creative Chemistry . . .
Your Partner
in Progress



The foundryman unclamps the pattern plate from the dump box. Notice the thin shell of partially-cured FOUNDREZ 7500 and sand clinging to the plate.

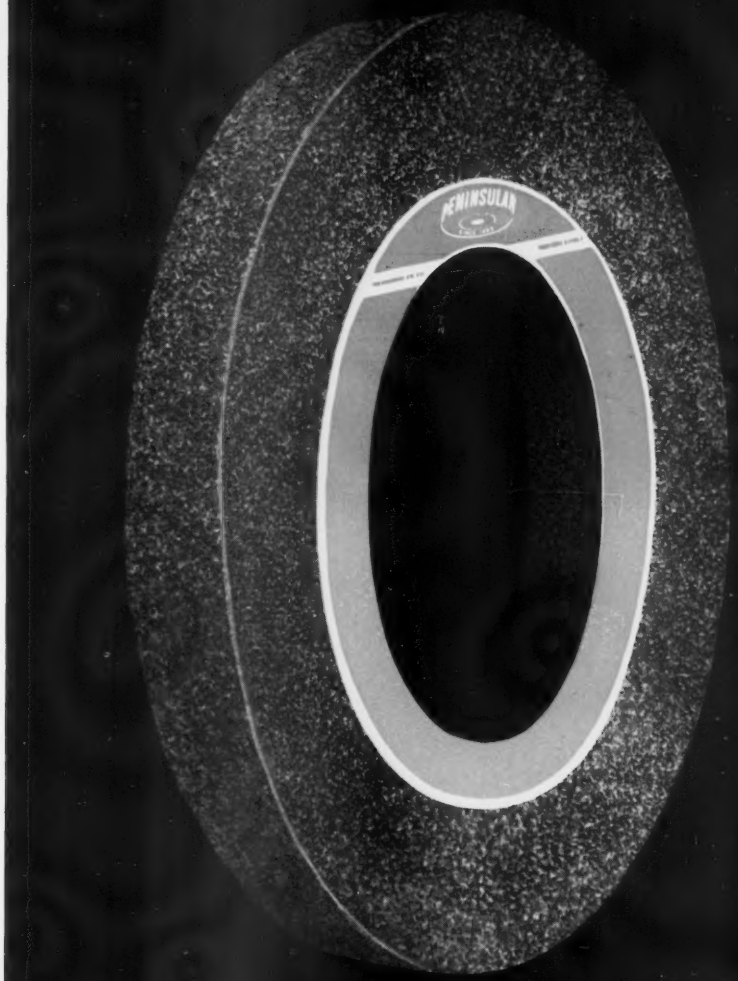
REICHHOLD

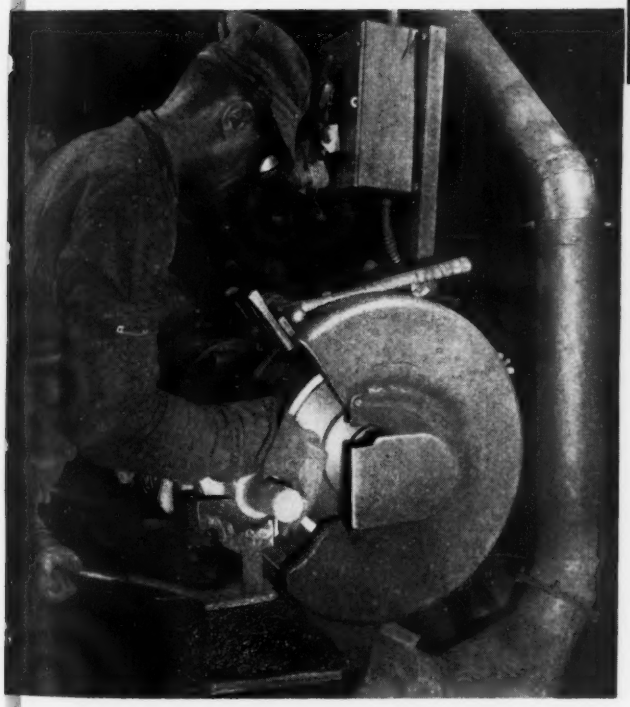
Synthetic Resins • Chemical Colors • Plasticizers • Phenol
Glycerine • Phthalic Anhydride • Maleic Anhydride • Sodium Sulfate
Sodium Sulfite • Pentaerythritol • Pentachlorophenol

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

there's no Lagging to your Snagging

with Peninsular Resinoid Grinding Wheels





Specify Peninsular Resinoid Grinding Wheels for faster, easier, more economical casting cleaning and billet grinding jobs. These superior grinding wheels have been created by technicians devoted solely to the production of better abrasive units for foundries and steel mills. They are manufactured in the Meldrum Avenue Plant, which is concerned only with Peninsular's resinoid wheel production. Behind them is sixty-six years steady progress in the making of better quality.

Where your job is especially rough and tough, Peninsular resinoid Grinding Wheels are the natural choice for lowering operator fatigue . . raising production curves!

Your inquiry will receive every attention from our experienced abrasive engineers. Write or wire us today, asking for Peninsular's new Catalog No. 5E, which gives complete data on vitrified and resinoid products.

PENINSULAR SINCE 1889

THE PENINSULAR GRINDING WHEEL DIVISION

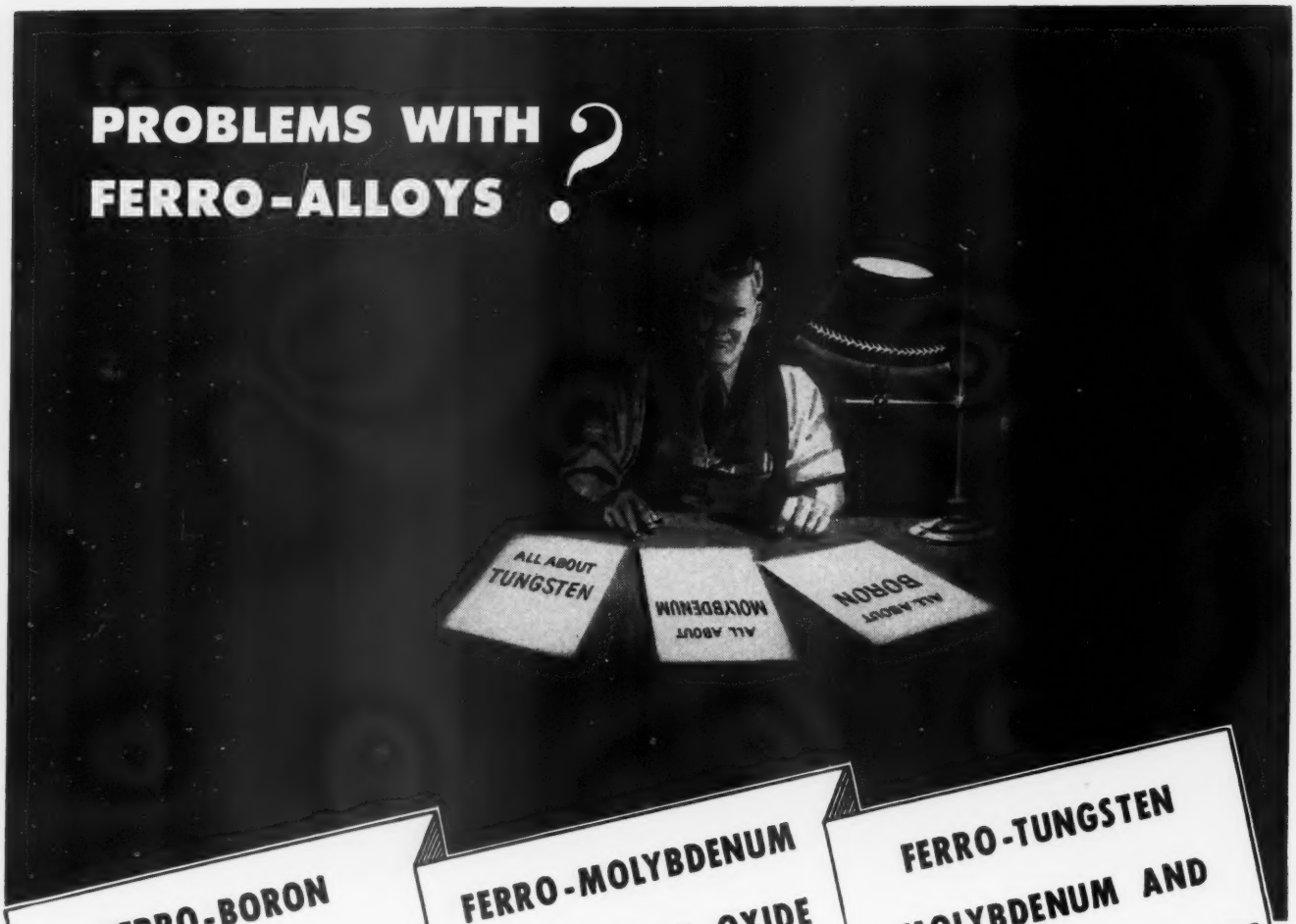
• • •

of ABRASIVE AND METAL PRODUCTS CO.

729 MELDRUM AVENUE, DETROIT 7, MICHIGAN

DISTRIBUTORS IN ALL PRINCIPAL CITIES

A&MP COMPANY



FERRO-BORON
BORON DEOXIDIZERS
BORIDE DEOXIDIZERS

FERRO-MOLYBDENUM
MOLYBDENUM OXIDE
RARE EARTHS

FERRO-TUNGSTEN
MOLYBDENUM AND
TUNGSTEN METAL POWDERS

CHEMICALS OF MOLYBDENUM . . . TUNGSTEN . . . BORON

Molybdenum is now available in unrestricted supply to improve strength and machinability. Dependable results are still one of its major attributes.

Tungsten, for hardenability and wearability improvement is now used in surprisingly small additions, with great success.

Boron, as an intensifier of the effects of other alloying materials, may be used in very minute additions, and yet maintain the essential properties of the castings desired. The most economical and satisfactory form to introduce Boron is recognized to be found in MCA's Ferro-Boron.

Operating the world's largest rare earth deposits, the Molybdenum Corporation of America has recently conducted extensive pioneering research in evaluating the properties, applications and uses of RareMeT Compound.

In nodular iron, small additions of rare earths have helped to produce consistently good ductility by counteracting subversive elements such as lead and titanium.

Write today for further information.

MOLYBDENUM
CORPORATION OF AMERICA
Grant Building **Pittsburgh 19, Pa.**

Offices: Pittsburgh, Chicago, Detroit, Los Angeles, New York, San Francisco
Sales Representatives: Edgar L. Fink, Detroit; Brumley-Donaldson Co., Los Angeles, San Francisco
Subsidiary: Cleveland Tungsten, Inc., Cleveland *Plants:* Washington, Pa., York, Pa.

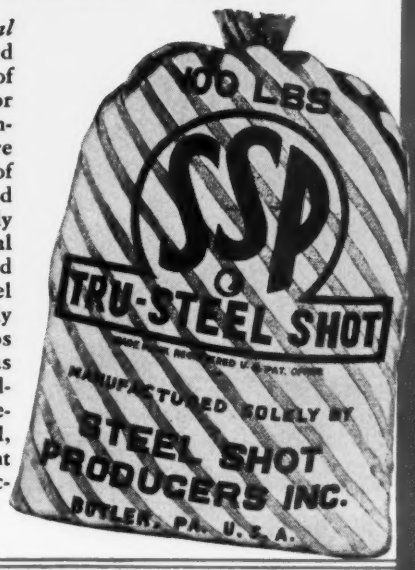
MCA

4 ORIGINALS—the leading abrasives for blast cleaning!

Four great names in metal abrasives stand alone in dominant leadership—all products of continuing research in development of better abrasives by America's pioneer maker of metal abrasives, Pittsburgh Crushed Steel Company and subsidiaries.

TRU-STEEL SHOT

Tru-Steel is the *original* super-tough, heat-treated and drawn steel shot of tool steel quality, for those cleaning and peening applications where the savings potential of its performance and longer life can be fully utilized. In such typical jobs as steel sheet and strip blasting, Tru-Steel provides an absolutely *clean* surface. Many jobs where blast cleaning has heretofore been considered impossible are being done with Tru-Steel, resulting in important savings in big-production blast cleaning.



MALLEABRASIVE®*

Malleabrasive is the *original* patented malleablized metal abrasive and the most widely used premium abrasive. Intermediately priced, Malleabrasive provides lower overall blast cleaning costs in more varying types of blast cleaning conditions than any other metal abrasive. Malleabrasive has been widely imitated, but genuine Malleabrasive is manufactured under the complete Malleabrasive process used by our organization only, providing Malleabrasive's unique and distinctive metallurgical structure.

*U.S. Pat. #2184926 (other patents pending)

"SAMSON" SHOT—"ANGULAR" GRIT

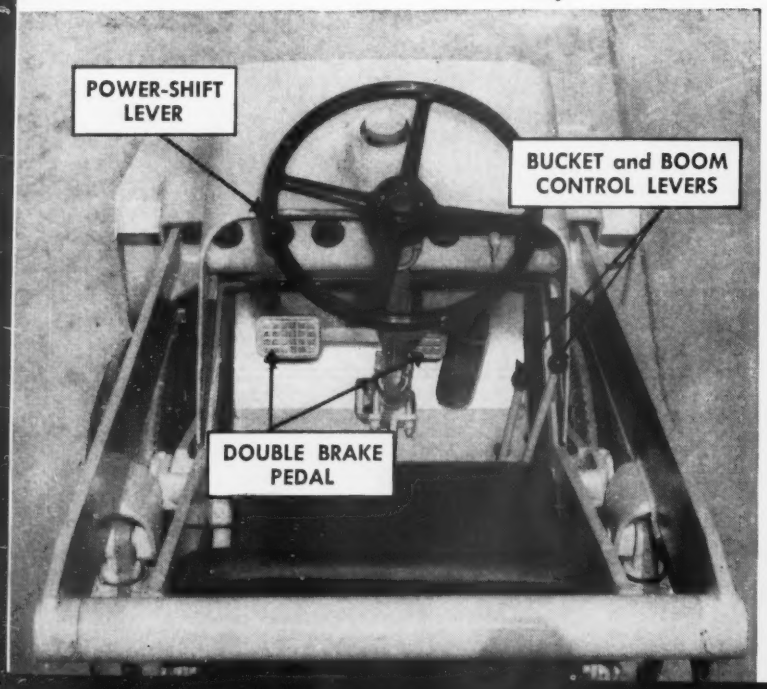
These are the *original* metal abrasives, the oldest and most famous names in metal abrasives . . . the products that led the conversion of foundries from the use of sand to metal abrasives for blast cleaning at the turn of the century. These are not ordinary chilled iron abrasives, but products of modern, unequalled manufacturing facilities, geared for production of metallurgically controlled abrasives of uniform chemistry, hardness and toughness. For operations requiring chilled iron abrasives, these are the *top leaders.*

LET US help you determine the type of metal abrasive most efficient and economical for your needs. 5 manufacturing plants, 13 distributing points, 33 sales and service branches at your disposal. Write us.

PITTSBURGH CRUSHED STEEL CO., Arsenal Station, Pittsburgh 1, Pa.

It's a pleasure to work here! There's plenty of leg room in the 12B because there are fewer operating controls . . . no clutch pedal, no conventional gear-shift levers. The power-shift lever on the steering column controls the shifts: High—11.2 mph; Low—5.6 mph; Reverse—10.5 mph.

LOOK, NO CLUTCH. Without taking his left hand from the steering wheel, the operator can move the power-shift lever to any speed or direction . . . even when moving. The right hand is free for the bucket controls; feet are free for brake and accelerator. The 12B is more maneuverable in tight quarters because the operator doesn't have to stop to shift.



Report on the 15 cu. ft. MICHIGAN 12B:

New Tractor Shovel features power-shifting, twenty per cent more weight and power

Heavier and more powerful than comparable machines, and infinitely easier to operate—that's the new MICHIGAN 12B. There's no clutch pedal or engine clutch on the 12B: Clark's power-shift transmission completely eliminates this notorious cause of excessive maintenance and down time. From the cutting edge of the 15 cu. ft. bucket to the flywheel of the 44 or 42 horsepower engine (gas or diesel), the MICHIGAN 12B is simply *more* machine.

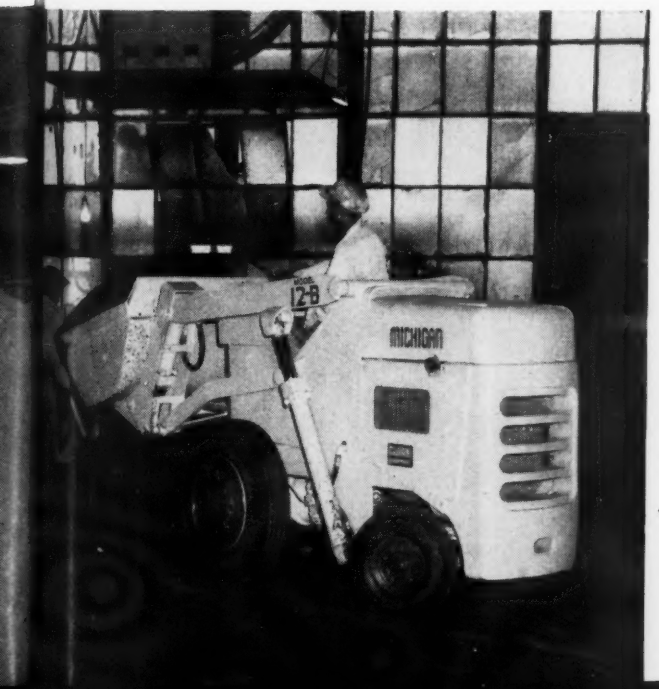
20% more weight and power. At 6250 lbs. (6350 lbs. diesel), the 12B is 20% heavier than most machines in its class. With 44 or 42 horsepower, gas or diesel, it is 20% more powerful. This margin of weight and power, plus bucket break-out action, enables the 12B to dig its way into material where other machines merely spin their wheels. The 12B's extra weight, low center of gravity and low-level bucket carry-position contribute to its superior stability: you can handle maximum loads safely and fast within its short turning radius.

Exclusive Clark power-train. The complete power-train of the new 12B is designed and manufactured by Clark. This combination of torque converter, power-shift transmission and planetary wheel axle gives you the most advanced industrial power-train on the market today. It was designed especially for industrial Tractor Shovel service—based on Clark's many years of experience as the leading manufacturer of industrial material handling equipment.

Instant power-shifting. Engine torque is multiplied up to 300% by the Clark torque converter—automatic torque build-up as you meet tighter, tougher materials. To shift between High, Low or Reverse, simply push the single power-shift lever to the desired position. Hydraulic power in the constant mesh power-shift transmission makes any shift instantly, even when travelling. There's no clutch pedal, no engine clutch, no gear clash. And as any operator will tell you, *it sure beats riding a heavy clutch all day!*

Complete dust protection. The 12B is protected against dust and dirt in every conceivable way. An oil bath air cleaner filters the air which enters the main hydraulic reservoir. There is a filter for the torque converter oil and the power-shift transmission oil. A partial flow filter protects the engine lube oil. Transmission, torque converter, starting motor and generator are all dust-sealed. On the 12B, every precaution has been taken to avoid dust problems.

Make your own comparison. Neither words nor specifications can indicate the working superiority of the new MICHIGAN 12B. You've got to see it in action—see it handling your toughest job. Call your local MICHIGAN distributor or write us direct to arrange an on-the-job demonstration. The new 12B is available on a low cost, no-down-payment Lease Plan—ask for details. Whether you lease or buy the 12B, it will pay for itself faster than any Tractor Shovel you've ever seen. See it!



Rugged bucket mechanism. The 12B's bucket mechanism is designed for strength and simplicity. There are no bell cranks; the boom and guide bar are straight members with fewer wearing parts. At 4 inches off the ground, you get 38 degrees tip-back. Positive "stops" on the bucket carrier provide clean dumping action.

MICHIGAN is a trade-mark of Clark Equipment Co.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
442 Second Street
Benton Harbor 36, Michigan

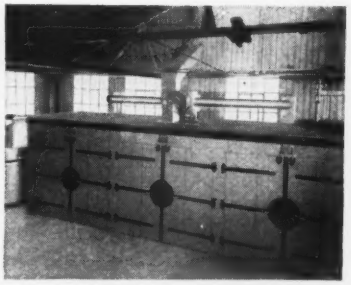
A LOT MORE THAN FANS DUCTS, HEATERS AND PANELS GO INTO . . .

LANLY FOUNDRY OVENS

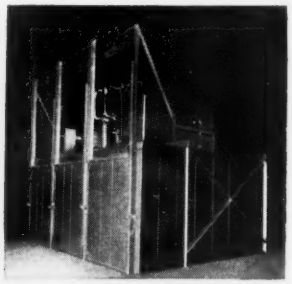
The proper adaptation and utilization of the essential component parts in every LANLY OVEN for maximum operating efficiency and economy, is a certainty being proved every day in foundries throughout the country. Specialized knowledge evolved from long experience and close cooperation with our customers enables us to design and erect better foundry ovens.

Upon receipt of information covering your needs, we will submit a proposal for an oven that will be thoroughly guaranteed as to construction and performance.

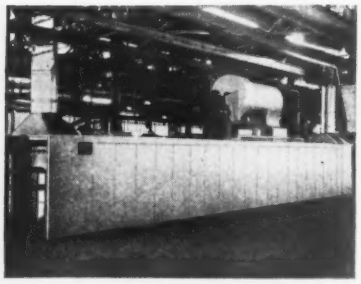
LANLY CAR TYPE OVEN featuring fast, uniform drying with low fuel consumption. Complete automatic operation. Sturdy construction yet pleasing in appearance. Comparative low initial cost.



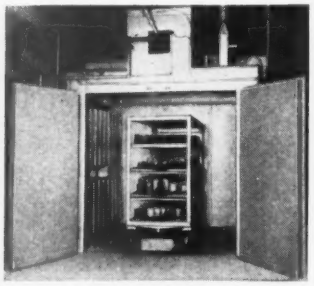
Three Compartment Rack Type Oven



3 Compartment Rack Type Oven



Continuous Core Blacking Oven



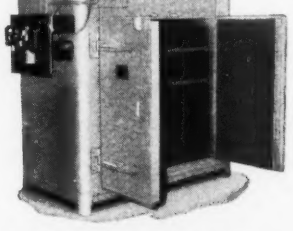
De-waxing Oven

Combination Rack and Drawer Type Oven

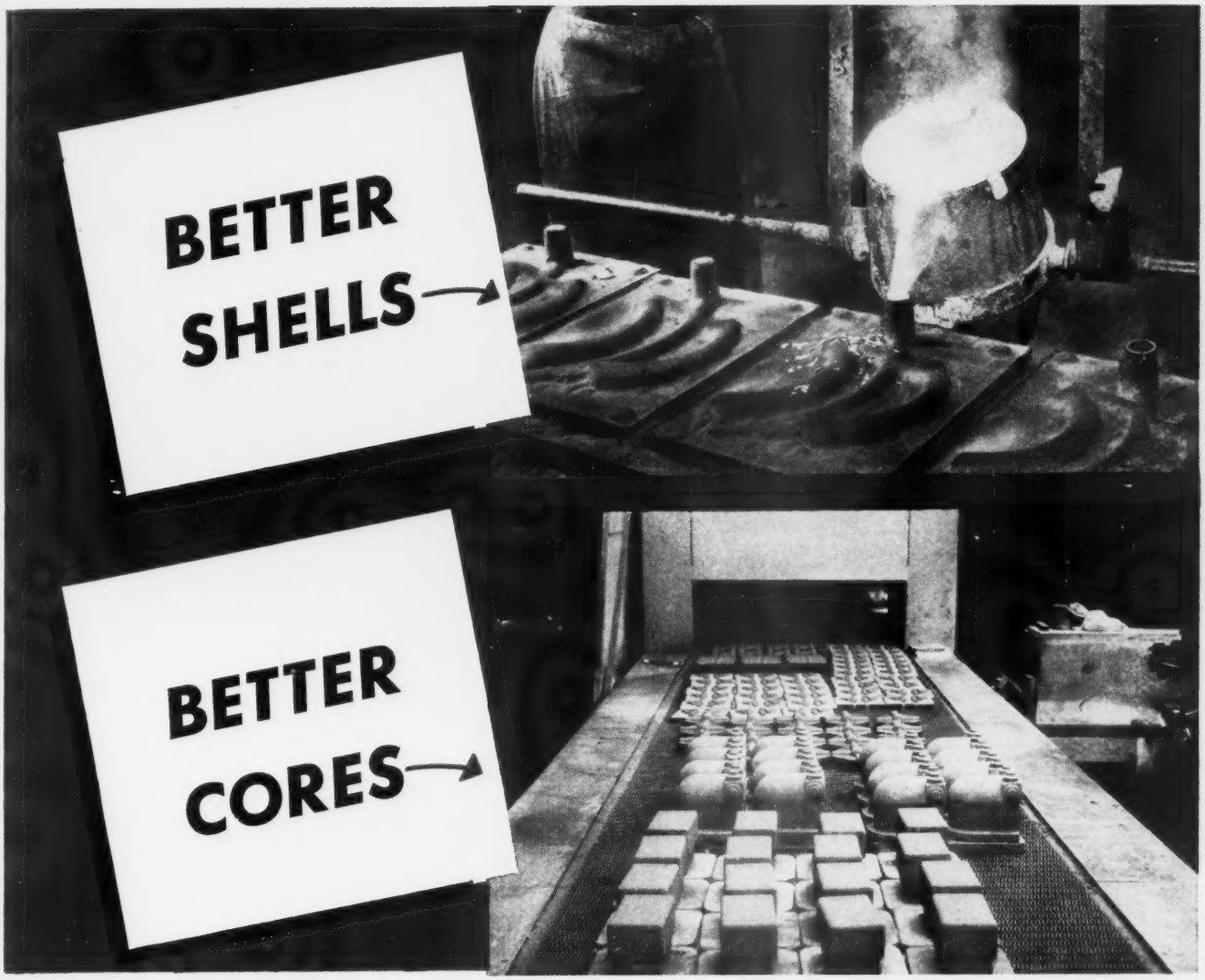
Plaster Mold Drying Oven

LANLY FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION



Shelf Type Core Oven



Pouring brass into shell molds above, and at bottom, cores moving into dielectric oven at Bronx Brass Foundry.

when you combine modern equipment with modern BORDEN RESINS

Modern foundry equipment . . . just like a modern automobile . . . performs best when used in conjunction with modern materials. And whether you're making shell molds or cores . . . the modern foundry resins come from Borden.

For shell molds—Borden's Thor MCF-7 resin assures a full-thickness build up, even on vertical pattern surfaces. It produces a flat, rigid shell without warpage. And it strips off the pattern cleanly and easily.

Jack Friedman of Bronx Brass Foundry installed the above dielectric core equipment last year, for use with modern Borden resin core binders. Says Mr. Friedman, "More efficient operation of our core department has paid for this equipment in less than a year."

In all efficient baking equipment, Borden's resin core binders assure clean, smooth-cored surfaces—help reduce scrap. They speed production, too, through faster bake-out . . . assure easier shake-out . . . contain no volatiles to gum up oven interiors . . . and minimize smoke so that working conditions are better.

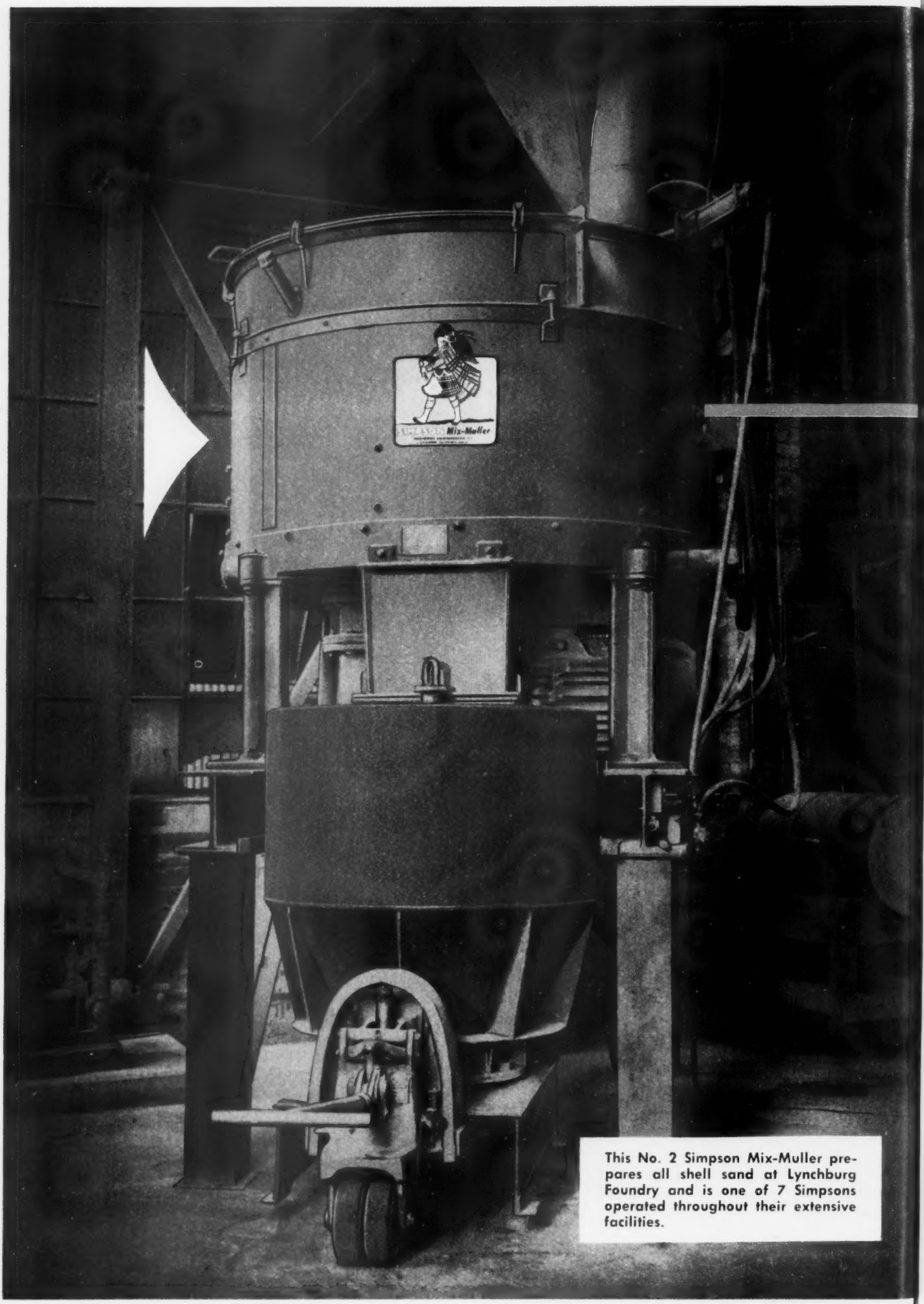
If you want to get the most out of your foundry equipment, let a Borden engineer help you get better results in less time. Write The Borden Company, Chemical Division, Dept. F-105, 350 Madison Ave., New York 17, N. Y.

Urea and Phenolic Resin Core Binders . . . Shell Mold Resins . . . Core Spray . . . Core Paste . . . Parting Agents

FOUNDRY RESINS

THE *Borden* COMPANY

CHEMICAL DIVISION



This No. 2 Simpson Mix-Muller prepares all shell sand at Lynchburg Foundry and is one of 7 Simpsons operated throughout their extensive facilities.

A VERSATILE SHOP IS SALES AMMUNITION AT LYNCHBURG FOUNDRY

Mix-Muller assures quality sand for all mechanized shell shop

A completely versatile foundry operation was the goal of Lynchburg Foundry, Lynchburg, Va. when they installed this new and unique all-mechanized shell shop. Added to their already extensive sand molding facilities including a pattern and machine shop, Lynchburg boasts one of the country's finest and most complete foundry services.

When equipment was chosen for the new shell shop Lynchburg selected the Simpson Mix-Muller shown on the opposite page . . . not only because they rely on Simpson's throughout their shop, but because a Simpson Mix-Muller can be depended upon to provide these qualities — so necessary to quality shell sand:

NO SEGREGATION of resins. A Simpson mulled batch stays mixed.

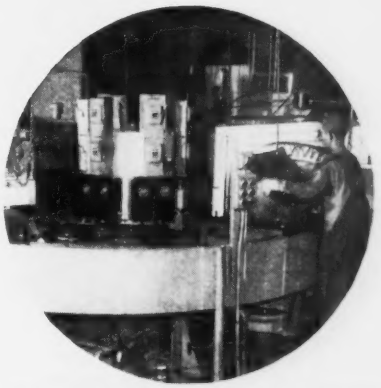
NO HEATING of mix. Positive mulling action *eliminates* danger of over heating.

NO OVERMIXING. You cannot overmix Simpson mulled shell sand.

These qualities add up to top finish, reduced machining for their customers and real *profit* on castings for Lynchburg . . . Qualities that you too, can *sell* with a Simpson Mix-Muller in your line-up.

Simpson Mix-Mullers are available in batch capacities of 50 • 250 • 500 • 1000 • 1500 • 2000 • 3000 • and 4000 lbs. There's one to fit your requirements. Write for bulletin 489 today.

Individual dump box molding machine is automatically controlled.

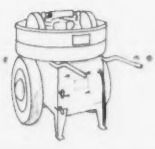


Rotary 6 station automatic molding machine was designed by Lynchburg engineers. 4 station machine is also used.

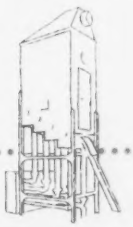
Final top-off shot is fed to flask through flexible rubber hose from overhead bin.

PRODUCTS OF A PRACTICAL FOUNDRYMAN

SIMPSON MIX-MULLERS
25 to 4000 lb. batch capacity

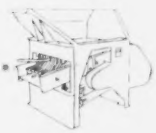


SIMPSON PORTO-MULLER
250 lb. capacity (100% portable)



NATIONAL SAND RECOVERY SYSTEM
Practical pneumatic sand scrubber

NATIONAL HYDRO-FILTER
Wet-type dust collector



NATIONAL SCREEN MASTER
Screening and magnetic separating unit.

National Engineering Company
(Not Inc.)
646 Machinery Hall Bldg. • Chicago 6, Illinois

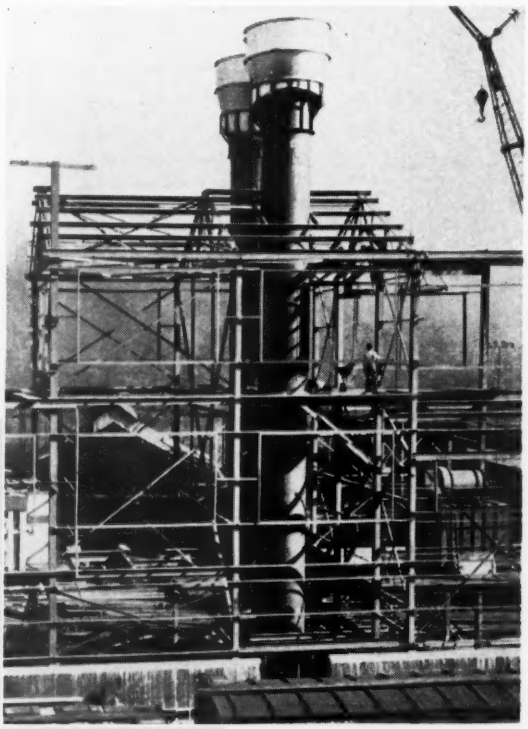
BUILT-IN ECONOMY

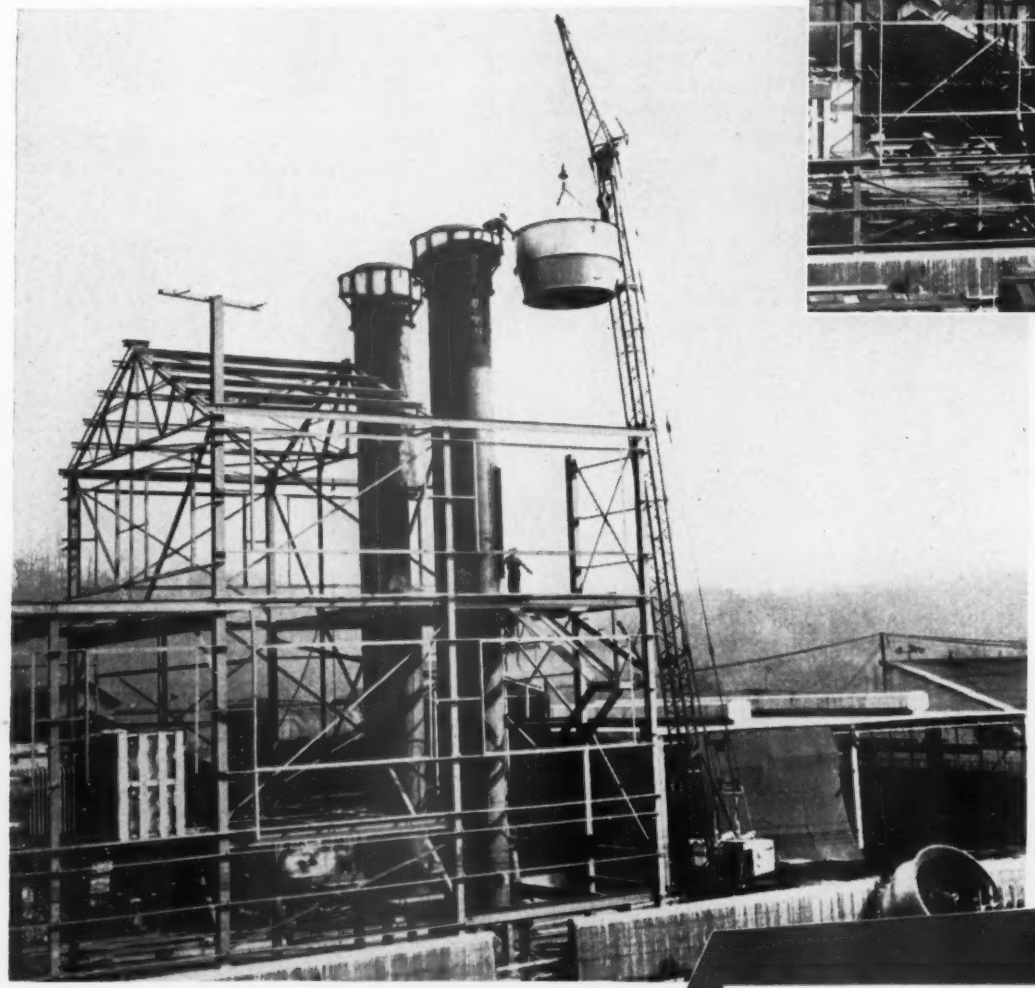
Like Lynchburg Foundry, you too, can save from the start by including Schneible Cupola Collectors in your plans RIGHT NOW!

The Lynchburg Foundry Company planned this new addition to save time and money. Installation of these Schneible Cupola Collectors was accomplished easily and economically with equipment already on the job for other structural work. No extra expense was necessary.

Further savings will be made from the start, because the Schneible Collectors will keep fly-ash and fumes from deteriorating roofs, gutters and other facilities thus extending the useful life of all original equipment.

Like Lynchburg, why not include Schneible "SW" Cupola Collectors and Multi-Wash Collectors in your plans and save right from the start.





Photos shown, "Courtesy of The Iron Worker, Lynchburg Foundry Company, Lynchburg, Virginia."

Cupola Collectors are "SW" type known throughout the industry as the most efficient and most economical wet method collectors available. Non-clogging distribution head, reuse of water and absence of moving parts mean practically no maintenance is required.

SCHNEIBLE

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station • Detroit 2, Michigan

Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

Late News

COPPER SQUEEZE: Fabricators and consumers of brass and copper products continue to be plagued by short supplies and towering prices. Electrolytic copper, which had a wartime ceiling of 12 cents a pound, has soared to 43 cents. The increase since a year ago is more than 40 per cent. At the same time, nonferrous foundries have seen the cost of secondary ingot zoom even faster. Red brass recently has been selling at more than 55 per cent above the level of a year ago, with somewhat smaller increases for tin bronze and manganese bronze.

Price increases on other primary nonferrous metals have been relatively small the last 12 months, although secondary aluminum has risen sharply. Primary aluminum ingot is up only 10 per cent; but secondary No. 12 foundry alloy has climbed more than 55 per cent. Zinc prices have increased less than 12 per cent, and magnesium is about 20 per cent higher than a year ago.

SECOND BEST: Shipments of castings during the first half this year were 25 per cent ahead of the 1954 pace. If this improvement is maintained during the second half, 1955 will be an 18-million-ton year, second best in history. The record year to date, 1951, had total shipments of 19¼ million. While the summer months saw the usual letdown in operations, the dip was no worse than a year ago and there has been a subsequent seasonal recovery.

TREND MIXED: Several types of castings are running ahead of the trend for the foundry industry as a whole. For instance, shipments of aluminum and zinc castings appear certain to set new records this year, and malleable iron has a chance of topping its peak year of 1951. Aluminum casting shipments for the first seven months exceeded the 12-months' totals for any of the years 1946 through 1950.

JOB SHOPS LAG: Shipments of gray iron castings through July were 27½ per cent larger than a year ago. Castings produced for sale showed a gain of more than 25 per cent. This would indicate that job shops were doing almost as well as the captive foundries. However, excluding specialty products such as ingot molds, pipe and car wheels, the tonnage of miscellaneous castings for sale was only 19 per cent ahead of last year.

Of the total of 5,331,980 tons of miscellaneous castings shipped through July, captive foundries accounted for more than 60 per cent. This is the highest percentage since the war. For all of 1954 it was 58 per cent.

INDUSTRIAL EXPANSION: Office of Defense Mobilization has its proposed capacity for production of primary aluminum in sight. No more government assistance for creating additional capacity will be offered. The annual capacity goal of 1,746,000 tons is more than matched by the 1,533,000 tons now in place plus 245,000 tons of additional facilities either planned or under construction by three companies—Aluminum Co. of America, Harvey Machine Co. and Olin-Mathieson Chemical Corp. Harvey, newcomer in the aluminum industry, plans to start building its reduction plant in Oregon early in 1956.

ODM also has cut off rapid tax write-offs in connection with certain other expansion goals which have been reached. These include gray iron castings. At the same time the closed goal for pig iron is to be reexamined and, pending further study, no action is to be taken on the steel castings goal.

PERSONALS: Walter R. Jaeschke, Whiting Corp., will present the 1956 official exchange paper from the AFS to the Institute of British Foundrymen . . . H. C. (Chuck) Esgar, a member of the Foundry Educational Foundation staff for the last four years, has resigned to become eastern Ohio and western Pennsylvania district manager of *Materials and Methods* magazine . . . Anton Dorfmueller Jr. has been appointed sales representative in the Buffalo territory for Foundry Products Division, Archer-Daniels-Midland Co., replacing A. S. Coulter. Mr. Coulter will retire early next year . . . Howard F. Taylor, professor of metallurgy and director of the Massachusetts Insti-

tute of Technology foundry laboratory, has been designated occupant of the newly established American Brake Shoe Co. chair of Professor of Foundry Metallurgy at MIT.

OBITUARY: Andrew C. Denison, 67, chairman of the board, Fulton Foundry & Machine Co., Cleveland, died Sept. 20 . . . William R. Pritchard, 70, personnel director and safety engineer, Zenith Foundry Co., West Allis, Wis., died Sept. 21 . . . M. D. Bensley, former owner of Frontier Brass Foundry, Niagara Falls, N. Y., and retired sales representative, Cleveland Flux Co., Cleveland, died Aug. 12 in Lake City, Fla.

OFFERS TO BUY: Blaw-Knox Co., Pittsburg, has offered to buy for cash the plant, equipment, inventories and certain other assets of Continental Foundry & Machine Co., East-Chicago, Ind., on a basis which would provide about $51 per share for Continental stock in liquidation.

KENNEDY SCHOLARSHIP FUND: As a tribute to the memory of the late Robert E. Kennedy, directors of Chicago Chapter of the AFS have added $500 to the $5000 scholarship fund established in his name last year. A provision was made that subsequent additions also may be made, and contributions to the memorial will be welcomed.

1956 AFS CONVENTION: Brochures on the AFS Castings Congress and Show to be held May 3-9, 1956, in Atlantic City have been mailed out to prospective exhibitors, and many requests for information and space already have been received, some from companies which have never exhibited before.

MISCELLANY: Industry's expenditures for new plants and equipment during the third quarter were at an annual rate of $29 billion, according to government estimates. It is expected to hit $29.7 billion in the fourth quarter, a new record . . . National Malleable & Steel Castings Co. and Union Carbide & Carbon Co. have received awards from the Cleveland Chamber of Commerce for excellence in construction and design of new buildings these companies built recently . . . Industrial production in August was 140 per cent of the 1947-1949 average, the Federal Reserve Board reports.

Prices of Foundry Metals and Coke

(As of September 26, 1955)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.00-17.00
OVEN	
Birmingham	$22.65
Buffalo	25.75
Chicago	25.75
Detroit	26.25
Erie, Pa.	25.00
Indianapolis	25.50
Kearny, N. J.	25.50
Lone Star, Tex.	19.50
Milwaukee	26.25
Montreal, Que.	27.25
New England, deld.	27.05
Painesville, O.	26.25
Philadelphia	25.00
St. Louis, del.	26.00
St. Paul	25.00
Swedeland, Pa.	25.00
Terre Haute, Ind.	25.50

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$61.00	$61.50
Birmingham	55.00	....
Buffalo	59.00	59.50
Chicago	59.00	59.00
Cleveland	59.00	59.00
Duluth	59.00	59.00
Erie, Pa.	59.00	59.00
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	59.00	....
Granite City, Ill.	60.90	61.40
Lone Star, Tex.	55.00	....
Neville Island (Pittsburgh)	59.00	59.00
Steelton, Pa.	61.00	61.50
Swedeland, Pa.	61.00	61.50
Toledo, O.	59.00	59.00
Troy, N. Y.	61.00	61.50
Youngstown, O.	....	59.00

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 42.50; tin bronze, No. 225, 56.50; No. 245, 48.75; high-leaded tin bronze, No. 305, 45.75; No. 1 yellow, No. 405, 34.75; manganese bronze, No. 421, 38.25.

ALUMINUM: 99 per cent plus primary ingots 24.40. Secondary No. 12 alloy 31.00-31.25. Deoxidizing grades: No. 1 30.50-31.75; No. 4 28.00-29.50.

MAGNESIUM: 99.8 per cent notched ingots 33.25, f.o.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 43.00 delivered Connecticut valley.

ZINC: High grade 14.35, delivered. Die casting alloy No. 3 17.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$36.00-37.00	**$47.50-48.00	.....	.....	.....	.....	$54.00-55.00
Boston*	**36.00-37.00	**30.00-31.00	.....	.....	**35.00-36.00	.....	.....
Buffalo	38.00-39.00	**40.00-41.00	.....	.....	**43.00-44.00	.....	51.00-52.00
Chicago	42.00-44.00	47.00-48.00	.....	51.00-52.00	51.00-52.00	52.00-53.00	57.00-59.00
Cincinnati*	**40.00-41.00	**45.00-46.00	**38.00-39.00	.....	**49.00-50.00	.....	57.00-58.00
Cleveland	43.50-44.50	47.00-48.00	37.00-38.00	48.00-49.00	49.00-50.00	51.00-52.00	56.00-58.00
Detroit*	**40.00	**39.00	**32.00	**42.00	.....	**35.00	.....
Los Angeles	32.00	**43.00-45.00	.....	.....	.....	.....	.....
New York*	40.50-41.50	34.50	38.00-39.00	.....	.....	.....	.....
Philadelphia	46.00-47.00	39.00-40.00	45.00-46.00	.....	47.00-48.00	57.00-58.00	.....
Pittsburgh	43.00-44.00	41.00-42.00	37.00-38.00	.....	45.00-46.00	.....	54.00-56.00
St. Louis*	36.50	43.00	36.00	46.00	.....	.....	55.00
San Francisco	34.00	42.00	36.00	39.00	48.00	.....	.....
Seattle	35.00	**35.00	**30.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Get ALL THESE 12 ADVANTAGES IN ONE READY-TO-USE CORE PASTE

LYQUAGRIP*

1. Ready mixed, uniform at all times
2. Light colored, odorless, non-corrosive, non-fermenting
3. Dries rapidly at room temperatures
4. Unaffected by normal storage
5. Will not boil or blister
6. No appreciable gas generation
7. Pasted joints are stronger than core
8. Unaffected by mold humidity
9. Will not harm steel, brass, bronze
10. Extra strong, uses 1/3 to 1/5 as much paste
11. Cores may be reheated without damaging pasted joints
12. Washes off hands and tools easily with warm water

* Trade Mark Reg.

Send for Literature

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence, R. I.

Manufacturers of

LYQUAFLOUR
For cleaner surfaces, better shake-out

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The liquid sand grain coating

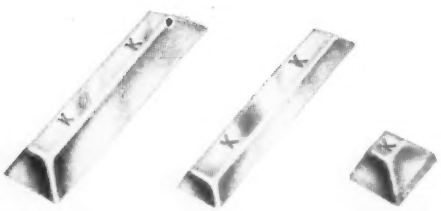
DOB-IT
Ready-to-use core mudding compound

HEAP BIG BLOWOUT!

Heap big "blow-out" – and *how!* It's our 40th birthday . . . and this is a good time to say "many thanks" to our customers. And to those folks who we hope will be customers in the many moons to come, may we say "You can always count on Keokuk Silvery Pig Iron. Car for car, pig for pig, its uniformity *never* varies. Charge it by magnet or count!"

Gratefully,

Chief Keokuk
Princess Wenatchee
X (Chief Keokuk Jr.)



Keokuk Silvery . . . the superior form of silicon introduction . . . available in 60 and 30 lb. pigs and 12 ½ lb. piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

SALES AGENT: MILLER AND COMPANY

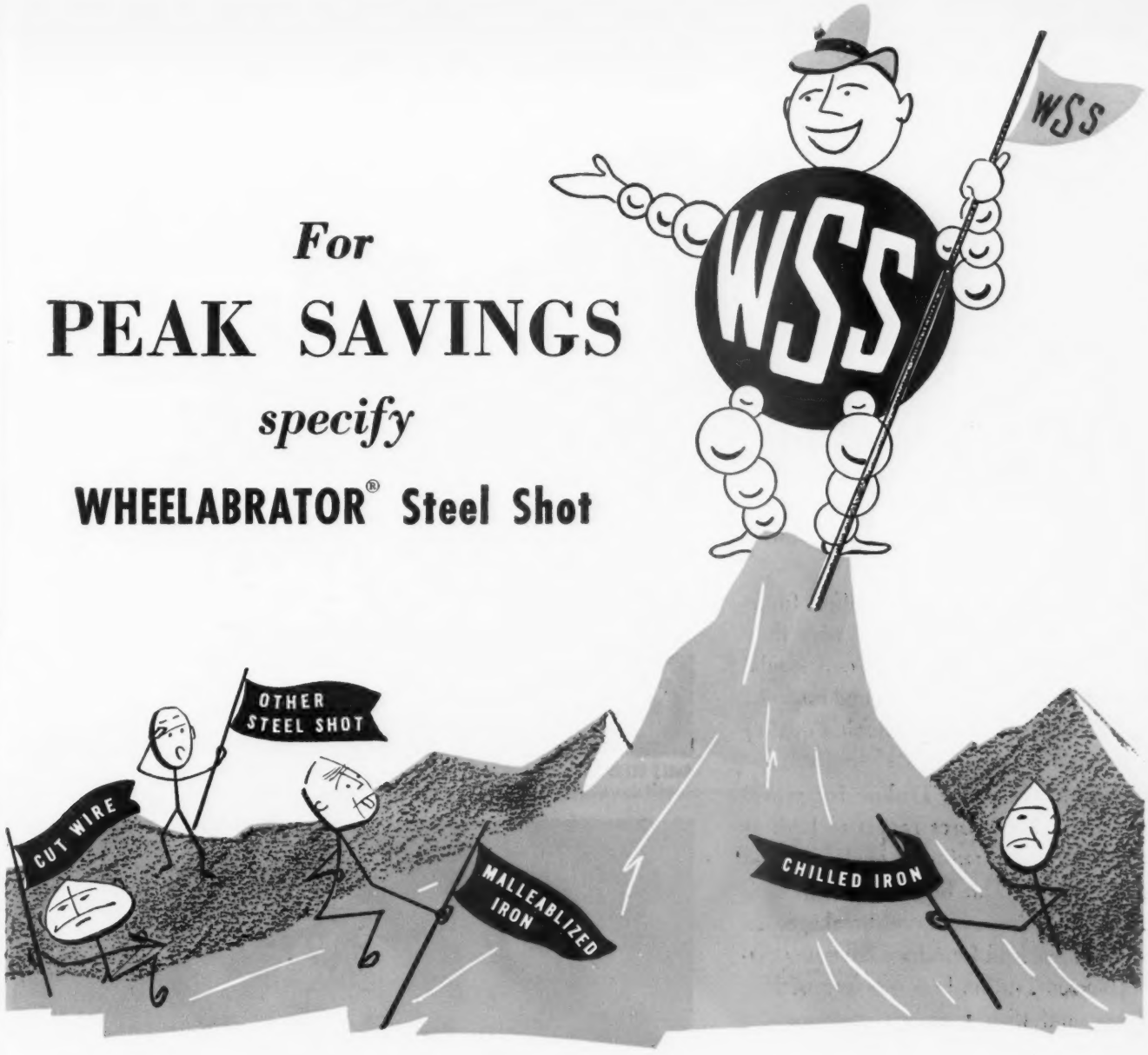
332 S. Michigan Ave., Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

For

PEAK SAVINGS

specify

WHEELABRATOR® Steel Shot



Wondering how you can choose one abrasive over another when they all look so much alike? Don't buy on appearance alone. Buy on proved performance. Let the cost-saving performance of Wheelabrator Steel Shot pay off in faster cleaning, more cleaning and better cleaning for every pound — for every pellet. Wheelabrator Steel Shot is made under such rigid controls that it achieves uniformity from pellet to pellet in hardness, roundness and toughness never before possible. No other abrasive ever reaches the *peak* performance that is the daily performance of Wheelabrator Steel Shot. Let this *peak* performance bring you *peak* savings. Use Wheelabrator Steel Shot. Write for Bulletin 89-B.

Wheelabrator® Steel Shot is Built for Peak Performance

1. Only Wheelabrator Steel Shot is produced to such exacting standards.
2. Only Wheelabrator Steel Shot is so carefully controlled for uniform quality.
3. Only Wheelabrator has such complete facilities for shot production.
4. Only Wheelabrator Steel Shot has a continuous pilot plant operation for research and development.

WHEELABRATOR
CORPORATION
(Formerly American Wheelabrator & Equipment Corp.)

505 S. Byrkit St., Mishawaka, Indiana

Trail Blazer of Industrial Progress

IRON AND STEEL SHOPS SAVE WITH TRULINE®

Today's accent on economy offers foundrymen convincing reasons why they should use Truline Binder in core sands. Savings in both man-hours and material costs are obtained in producing quality castings.

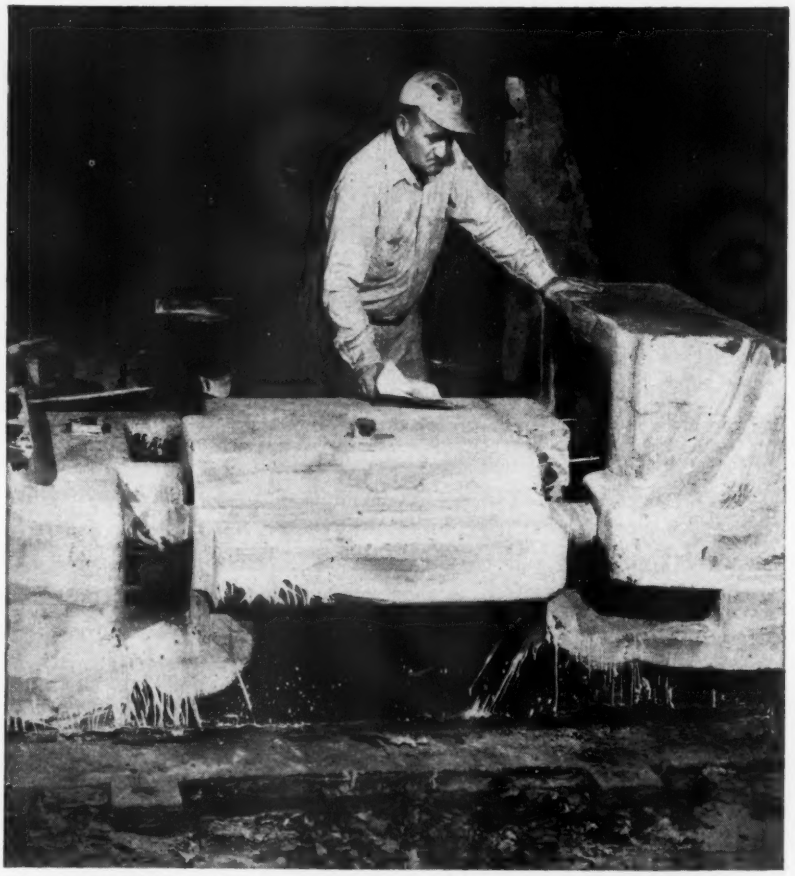
Iron shops using Truline for gravel and black sand cores report as high as 50 per cent reduction in shake-out and baking time. The high baked strength tends to eliminate core breakage. In some cases, iron foundries have successfully used Truline in a mixture of half heap sand with new, for medium and large core work.

Truline gives faster and more uniform baking—smoother, cleaner casting surfaces. Steel shops report its high efficiency in core facing sands, backing sands, and pouring cup mixes. Truline is equally effective for skin dry and dry sand molds. It has high resistance to moisture pickup.

Let us give you the up-to-date story on how Truline can help you save time and money.

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
920 King St., Wilmington 99, Delaware

BAKES OVERNIGHT—Iron shops solve baking bottlenecks by using Truline. This core was baked thoroughly in one night at 400°F.—halving the time required with other binders.



COLLAPSES QUICKLY—Truline helps prevent cracked castings, even where thickness of metal sections varies from one and one-half inches to eight, because cores collapse easier.

NF54-2

20,000 INSTALLATIONS
Lower Cost to You!

Type D ROTO-CLONE combines design and mass production economies to make it the lowest priced dust collector in its class.

Why is ROTO-CLONE priced so low? Manufacturing experience with 20,000 Type D ROTO-CLONES has introduced production economies reflected in low cost to you—the lowest cost of any collector in its class. By class we mean units of 1,500 to 15,000 cfm capacity designed for handling dry, granular dust.

Why are space requirements less? ROTO-CLONE* provides everything you need, except duct connections, in one complete, shop assembled package—high efficiency collector, exhauster, motor, drive and dust storage hopper. This compactness makes its relocation easy and economical with change in process, plant layout or production equipment.

Why is performance outstanding? ROTO-CLONE'S collection efficiency is constant regardless of exhaust volumes handled. Its cast-iron housing, cold-rolled steel blades, taper-lock hub and heavy-duty, antifriction bearings assure long, maintenance-free service.

For complete product information, call your local AAF representative or write direct for Bulletin 272.

**ROTO-CLONE is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.*

AAF
herman nelson

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

Specialty
Safety Products

AO† "H"

Series Face Shields give **Top Value** for Your Protection Dollars

New H-5
Face Shield
unique features
simplify window
interchange

New H-5 has a full crown or spark deflector, new quick-fastening studs in front, and end clips which hold window securely. Chemical splashes cannot enter between window and headgear. Excellent impact protection. Available with acetate windows (clear or green), 24-mesh screen, and fibre. All windows optically correct and extra large (18¼″ x 10″).

H-1. Sturdy, cool and comfortable. Adjustable elastic headband may be worn low on head for additional comfort. Standard Leather Sweatband and Window, snap-on type, are easily replaced. Acetate Windows, Clear or Green, in 3 sizes: (5″ x 11½″; 6″ x 11½″; 8″ x 11½″), and 3 thicknesses (.020″, .040″, .060″). Edge of .020″ thick window aluminum-bound.

H-2. Same as H-1 but with standard spark deflector for added protection.

H-3. Same as H-2 except that back headband is fibre, adjustable, styled to fit lower portion of head snugly. Long band slides within a fibre sleeve, permits easy adjustment, prevents hair pulling. Adjusts by knurled nut.

H-4. Has H-3 features plus full spark deflector for work in tight places where head bumps or lacerations are hazards. Deflector protects forehead and frontal scalp from flying particles. When ordering specify type of shield, size, thickness and shade of window. Refer to AO Eye Protection Catalog, S-2363, Page 54. Or ask your nearest AO Safety Products Representative.

124SB-3
Straightaway
Sound Protector

MUFFLES HARMFUL PLANT NOISE

A new addition to AO's Sound Protectors. Accommodates larger ears, cuts out harmful noise. Headband is rugged, adjustable, padded. All connections insulated. Oval shaped ear cups fit snugly, stay comfortably in place, seal opening at jawbone section. Available with built-in earphones.

†T.M. Reg. by American Optical Company

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Heroult ELECTRIC MELTING FURNACES

TOPS FOR PRODUCTION OF HIGH GRADE STAINLESS, ALLOY AND RIMMING STEELS

The Ideal Furnace for Foundries

ASK FOR NEW CATALOG
Here's a comprehensive discussion of the modern electric furnace you will surely want to keep for frequent reference. Contains up-to-date information on Heroult Electric Furnaces—types, sizes, capacities, ratings, etc. Write Pittsburgh Office for free copy.

THE HEROULT IS THE SAFEST, most dependable electric furnace on the market. Available in foundry sizes with either Gantry or swing-type roof, the Heroult is equipped with the latest time- and labor-saving mechanical devices and electrical controls. It is noted for its efficient performance, simplified operation, and low operating and maintenance costs.

We welcome an opportunity to help you select and install the electric foundry furnace best suited to your particular requirements.

AMERICAN BRIDGE DIVISION

UNITED STATES STEEL CORPORATION, GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities.

United States Steel Export Company, New York

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

AMERICAN BRIDGE

UNITED STATES STEEL

202

Make Their Own Foundry Patterns

FASTER—AT FAR LOWER COST

with Rockwell-built

DELTA POWER TOOLS

"With DELTA Power Tools, we're able to make our own patterns faster, and for less money, than by buying them on the outside," reports J. R. Wallace, pattern shop supervisor at Edward Valves, Inc., East Chicago, Indiana.

"DELTA Tools have helped tremendously in reducing our pattern cost. Their accuracy and flexibility have enabled us to meet production deadlines while holding tolerances as close as 1/64th of an inch."

"Delta's low price makes it possible for us to speed our work by purchasing two Deltas, rather than one large, expensive machine. . . . And there's practically no maintenance. These rugged machines never get out of alignment. As far as we're concerned, DELTA is the best industrial tool made." Of the 10 Delta-built tools in Edward Valves' pattern shop, several have been in daily use for more than 30 years!

Edward Valves is only one of hundreds of foundries cutting costs and improving production with DELTA Power Tools—not only in pattern making, but in finishing operations, too. For instance, DELTA Metal-Cutting Band Saws, Cut-off Machines, and Abrasive Finishing Machines provide unusual efficiency in casting header removal, deburring, and surface finishing.

Delta Power Tools can help YOU cut costs and improve production. Talk to your Delta Dealer today, he's listed in your telephone book under "Tools" or "Machinery," or send the coupon for complete catalog information.

This 20" band saw is one of ten Delta Tools in the pattern shop of Edward Valves, Inc. Operator N. H. Luecke is shown cutting out a small piece for a new valve pattern.

Operator Leroy Schmidt uses DELTA 12" Tilting Blade Saw to speed precision woodworking in the pattern shop at Edward Valves, Inc., which is equipped with 10 Delta-built tools.

Pattern maker drills the core box of a 10" piston pattern on a DELTA 17" Drill Press at Edward Valves, Inc. Tolerances are often held to 1/64".

DELTA QUALITY POWER TOOLS
Another Product by **Rockwell**

DELTA ROCKWELL

DELTA QUALITY COSTS NO MORE

Delta Power Tool Div., Rockwell Manufacturing Co.
706-K North Lexington Avenue, Pittsburgh 8, Pa.

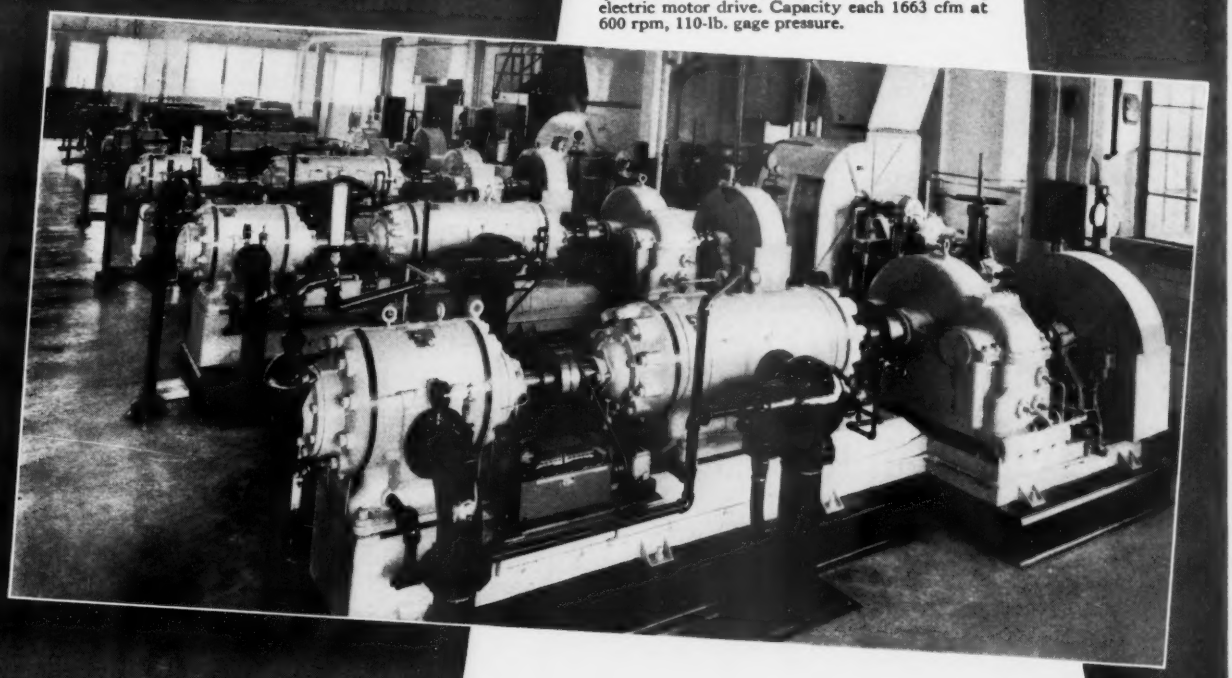
☐ Please send DELTA AB catalog.

☐ Please send name of my nearest DELTA Dealer.

Name_____

Address_____

City_____ Zone_____ State_____



Four C-300-300H Fuller Compressors, steam turbine drive. Capacity each 1248 to 1805 cfm with a corresponding speed range of 450 to 650 rpm; one 125 and three 110-lb. gage pressure. Two C-300-300H Fuller Compressors, electric motor drive. Capacity each 1663 cfm at 600 rpm, 110-lb. gage pressure.

PUTTING THE AIR IN AIRCRAFT

Aircraft companies use a lot of compressed air in the manufacture of airframes, engines, systems and components. The battery of six Fuller compressors pictured above meets one important aircraft facility's entire diversity of compressed air needs, efficiently and economically.

The key to Fuller's smoother operation is *rotary motion*, which provides large capacity in relation to size, simple direct drive from motor or internal combustion engine, minimum number of working parts, one-way air flow free from pulsation, lack of vibration, continuous service with minimum supervision and maintenance. Operation in cramped quarters or on ordinary flooring is simple and practicable.

Fuller Rotary Compressors are built for capacities to 3300 c.f.m., 125-lb. pressure. Write for Bulletin C-5A, illustrating and describing these machines.

Fuller

. . . . pioneers in harnessing AIR

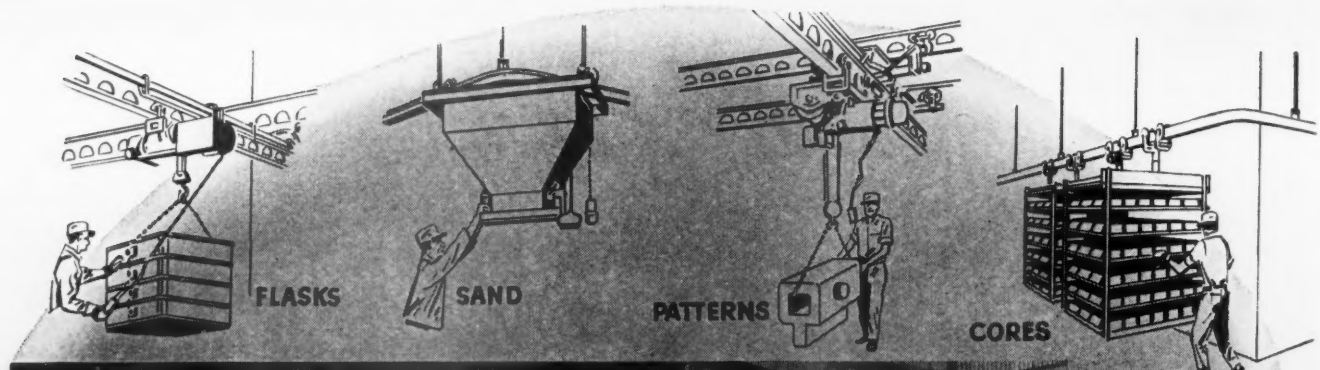
C-274
1776

FULLER COMPANY GENERAL AMERICAN TRADE MARK

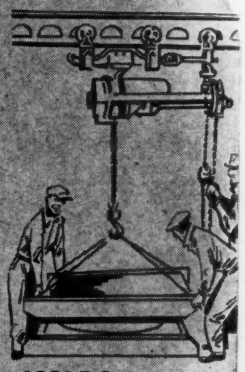
FULLER COMPANY, Catasauqua, Pa.

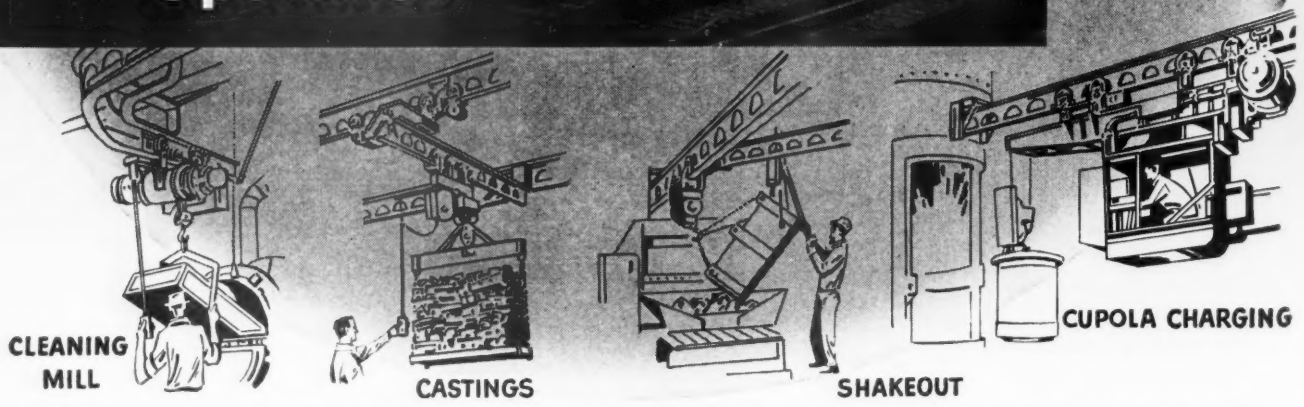
GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY

Chicago • San Francisco • Los Angeles • Seattle • Birmingham



Versatile Cleveland Tramrail Speeds Every Foundry Operation





Wherever materials must be lifted and moved, Cleveland Tramrail overhead materials handling equipment can save time, make the work easier and safer, speed production and cut costs.

Because 150 to 250 tons of various materials must be handled to produce a ton of finished castings, foundries find Cleveland Tramrail particularly advantageous. In many cases the use of Cleveland Tramrail means the difference between profit and loss. Because it affects the price of the finished product so greatly, it will be a key factor for numerous foundries in obtaining orders during periods when the competitive situation is keen.

Talk over your foundry handling with a Tramrail engineer. A nearby representative will be glad to visit you without obligation.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3835 East 286th Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

New Foundry List

now available

for immediate delivery.

Who? Where?

Metals Melted?

Melting Equipment & Capacity?

Departments Operated?

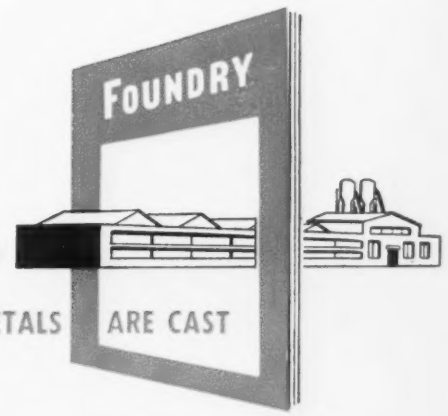
Casting Methods?

• For many years, FOUNDRY has conducted an intensive census of the foundry industry in the United States and Canada . . . every two years, basic information on all foundries is published in *Penton's Foundry List and Directory.*

The 1955-56 Edition of PFL is now available. It gives comprehensive information on all of the 6,208 metal casting plants in the U. S. and Canada. It tells who they are and where they are located; what metals they melt, their melting equipment capacities, and departments operated.

Well-indexed, and in loose-leaf form, PFL is useful to casting buyers and foundry suppliers. For prompt delivery, write: Book Department, FOUNDRY, 1213 West Third St., Cleveland 13, Ohio.

PRICE: $9.00 PER COPY
orders now being taken for immediate delivery.

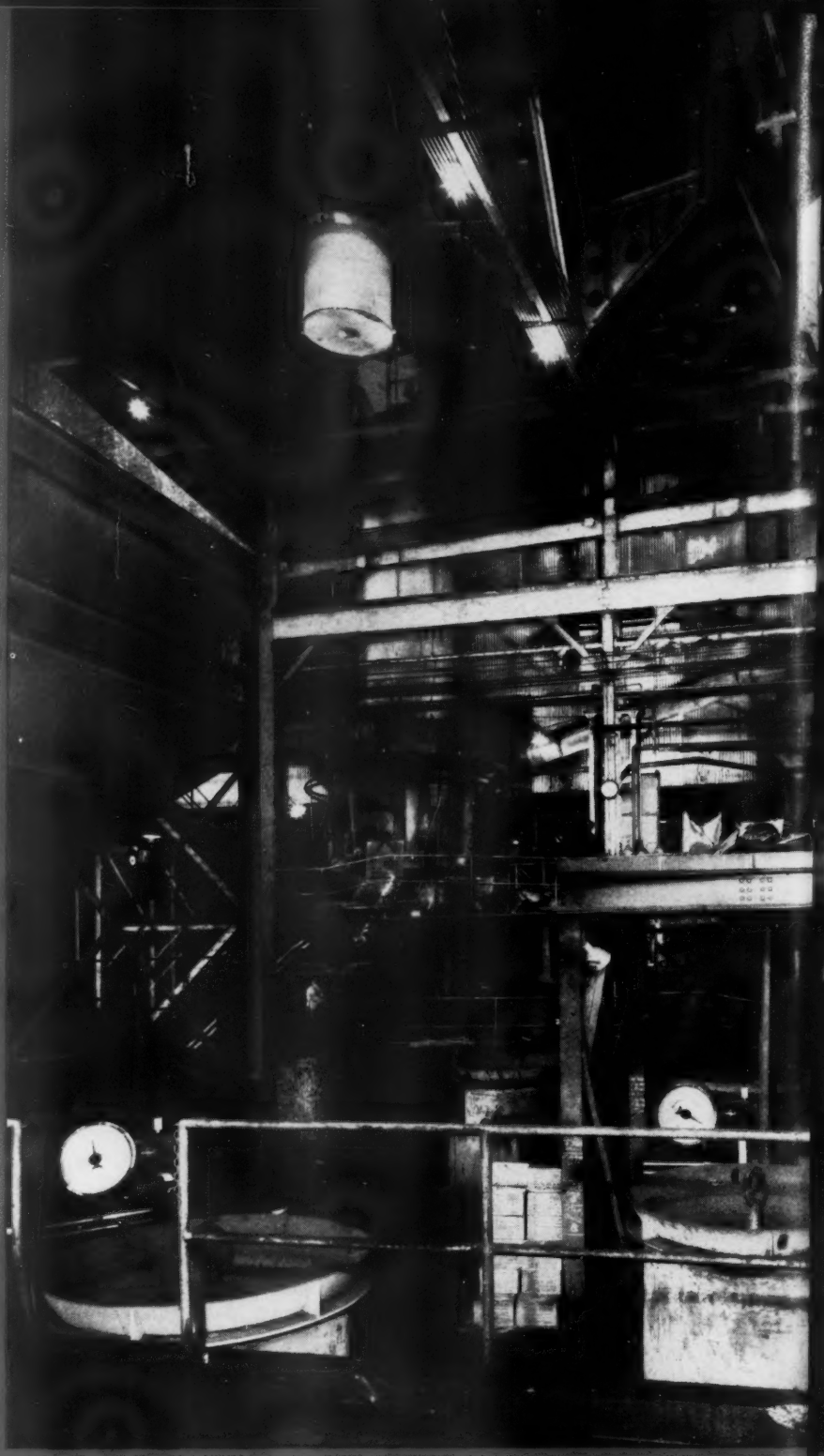


Serving Foundrymen

WHEREVER METALS ARE CAST

A PENTON PUBLICATION, PENTON BUILDING, CLEVELAND 13, OHIO

Whiting Cone-Bottom Bucket ▶
suspended from the Whiting Horseshoe Charger on its way to the cupola.



Trambeam System ▶
automatically conveys full ladles to pouring bays, returns them empty.

◀ **Trambeam Monorail Switch**
permits hand switching of empty pouring ladles from main track for refilling.

NATIONAL MALLEABLE

Gets steady, dependable charging with one man control

... and Whiting equipment

Operations at National Malleable and Steel Castings Co., Cleveland, require steady, dependable charging to produce an average of 55 to 65 tons of metal an hour during a 16-hour day. To maintain this production pace, they installed two unique and efficient "one man" charging systems. Each of the two systems is comprised of two Whiting cupolas which are serviced by nine Whiting Cone-bottom Charging Buckets and two Whiting Horseshoe Chargers. A crane operator loads metal charges into buckets with magnet and chute. Then, a single operator stationed at each system loads and weighs the buckets by means of a continuous "merry-go-round" conveyor. Buckets are transported to the cupolas via the Horseshoe Charger.

The metal is tapped into pouring ladles which are conveyed by means of a Whiting Trambeam monorail system to the pouring bays. Whiting engineered switches permit moving the ladles off the main monorail track to any of several bays without delay. Empty ladles are switched back onto the main Trambeam track and returned automatically for refilling.

This operation shows how Whiting equipment and engineering is used for profitable foundry operations.

Write today for information on Whiting's complete line of foundry equipment.

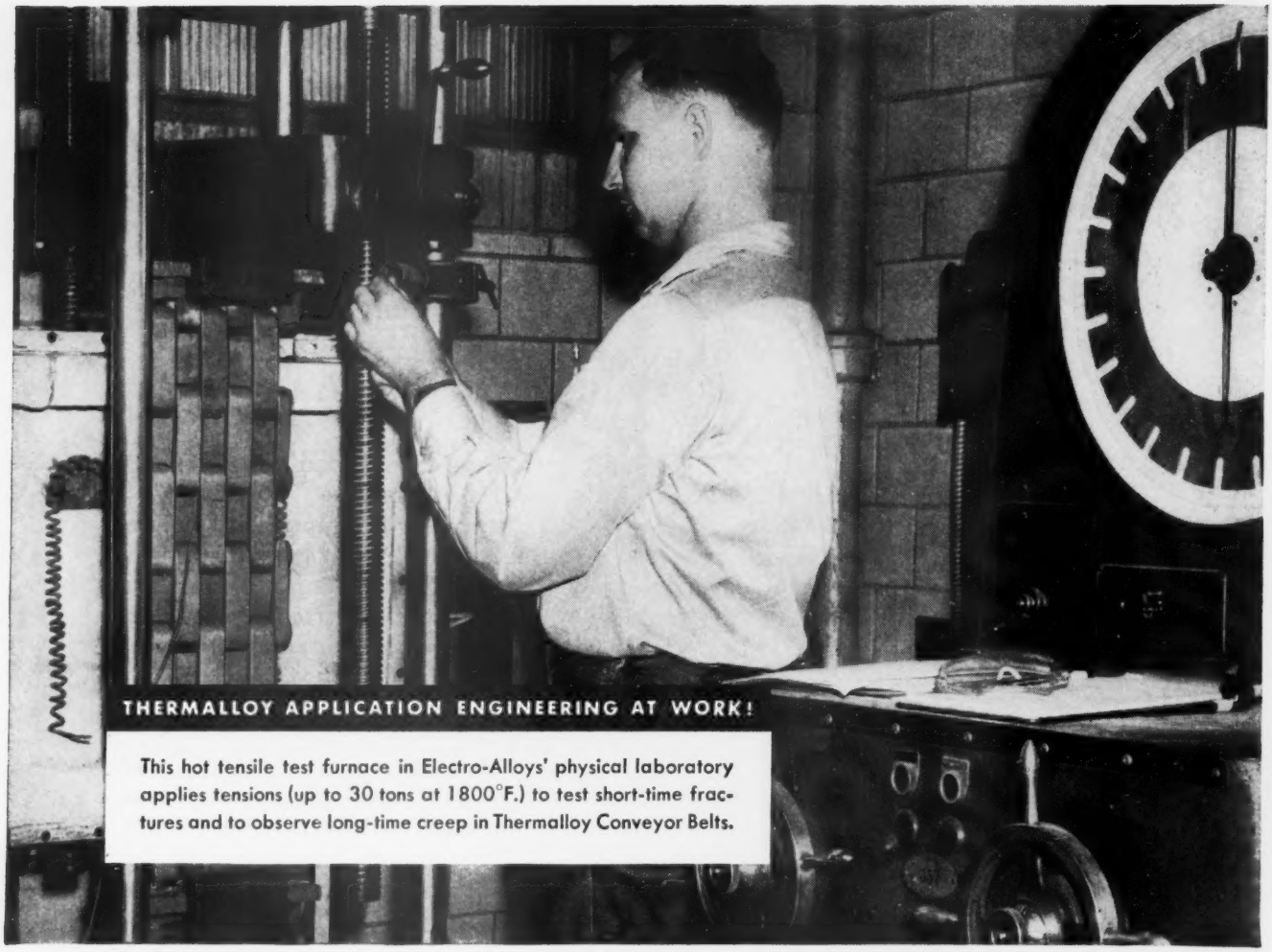
WHITING CORPORATION

15607 Lathrop Avenue, Harvey, Illinois

WHITING

Whiting Foundry Products Include:

Cupolas • Cupola Spark Suppressors • Cupola Hot Blast Equipment • Cupola Blast Moisture Control Equipment • Cupola Charging Systems Cradle Furnaces • Hot Metal Mixers • Duplex Melting Systems Air Furnaces • Electric Melting Furnaces • Ladles • Ladle Handlers Ladle Preheaters • Tumbling Mills • Annealing Ovens Transfer Cars • Pulverizers • Pulverized Coal Firing Systems Turntables • Electric Traveling Cranes • Trackmobile • Trambeam Overhead Handling Systems



THERMALLOY APPLICATION ENGINEERING AT WORK!

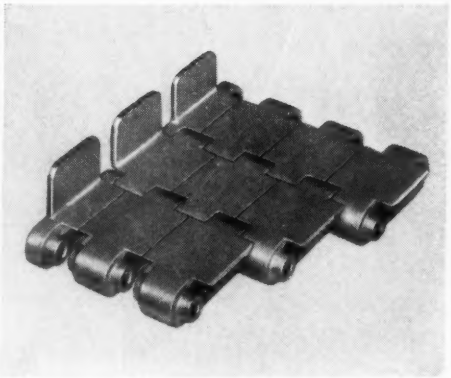
This hot tensile test furnace in Electro-Alloys' physical laboratory applies tensions (up to 30 tons at 1800°F.) to test short-time fractures and to observe long-time creep in Thermalloy Conveyor Belts.

A miniature furnace to test theories!

Service life of a heat-treating furnace conveyor belt may be affected by so many variables, i.e. uneven loading, misalignment, temperature differentials, etc., that proper design, highest quality and the right material are of utmost importance.

At Electro-Alloys, a staff of engineers and metallurgists are constantly studying these factors in the physical testing laboratory shown above. A hot tensile test furnace is continually in use subjecting Thermalloy* conveyor belts to various combinations of loading and temperature. In this way, design theories developed by our engineers are tested and highest possible quality standards are maintained to insure production of furnace conveyor belts that will be the ultimate in trouble-free operation.

Electro-Alloys also applies engineering and metallurgical know-how in the production of heat-resistant Thermalloy castings for other furnace parts such as sprockets, idlers, skid rails or rollers, crossbeams, wall boxes and radiant tube assemblies. For complete information, call our nearest representative or write for Thermalloy Conveyor Belt Bulletin T-241, Electro-Alloys Division, 6005 Taylor St., Elyria, Ohio.



To meet extra-severe operating conditions, a Thermalloy Heavy-Duty Conveyor Belt was developed. This partially assembled belt shows the short integral cast pins that eliminate "crank-shafting."

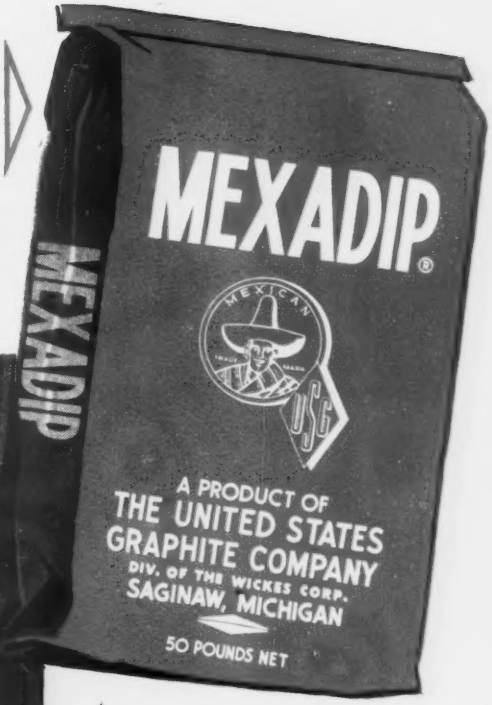
AMERICAN Brake Shoe COMPANY

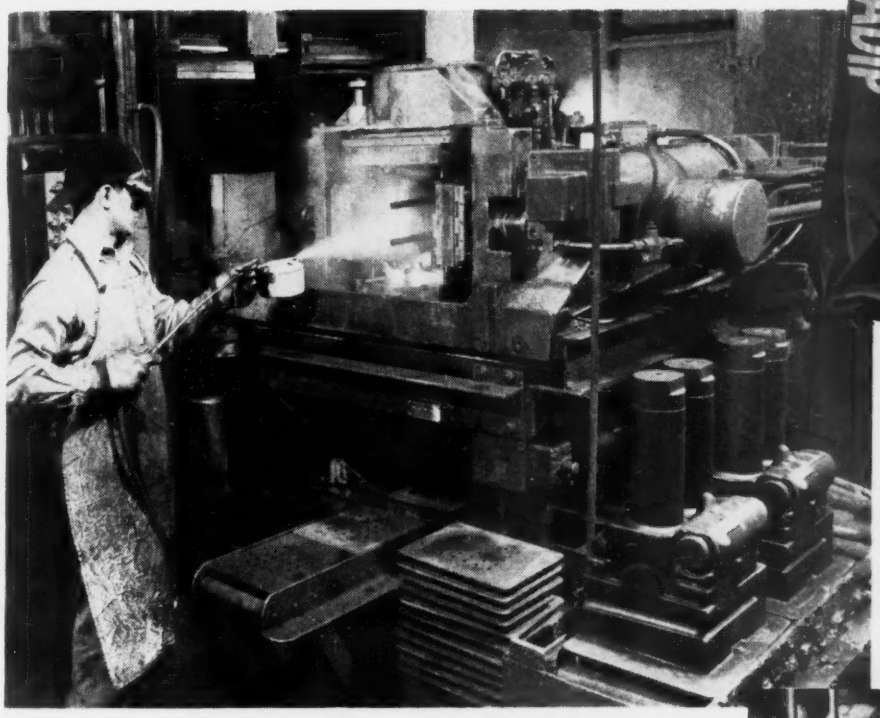
ELECTRO-ALLOYS DIVISION

Elyria, Ohio

*Reg. U. S. Pat. Off.

the core coating doing the job at America's newest automotive foundry





Barrel cores awaiting transfer to conveyor racks for baking oven after being coated with Mexadip.

Spraying cylinder jacket cores with Mexadip after cleaning.

208

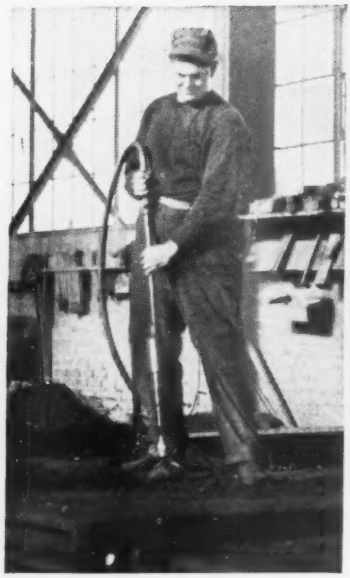
Getting barrel cores and cylinder jacket cores to the pouring line on time and in perfect condition is vitally important in automotive engine production. In the newest of these foundries, MEXADIP is doing its part . . . doing the best core coating job and helping to keep the lines running on schedule.

MEXADIP has done the job consistently for years in some of America's largest foundries. It's a refractory core coating that has all the "built in" requirements the modern foundryman demands. Requires only water to prepare • does not ferment • contains its own binder • used for green or baked cores . . . in fact, if your cores are large or small, for ferrous or non-ferrous casting, large production or batch jobs, MEXADIP is the one core coating you can depend upon for all your production.

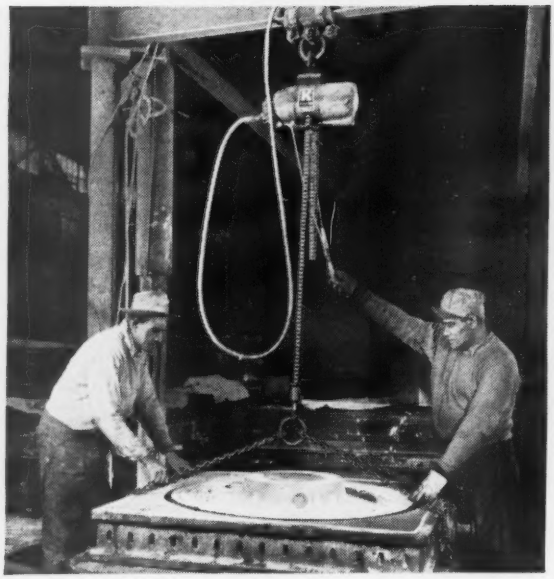
OUR 101ST YEAR

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN



Tampers by Gardner-Denver.



Air hoists by Keller Tool and Gardner-Denver.

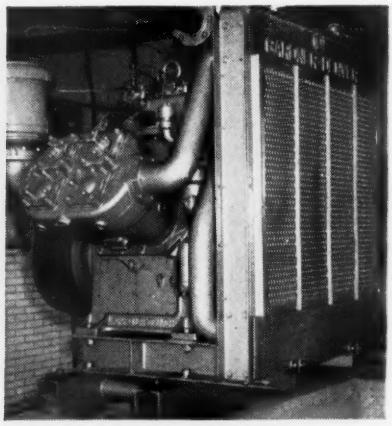
Precision grinders by Keller Tool.

Quality air tools for the foundry by Gardner-Denver and Keller Tool

Designed to fit the job and do it faster, easier. Built to stand the gaff of foundry life—to stay on the job with minimum maintenance. Send for bulletins and for specifications.

Chipping and scaling hammers by Keller Tool.

Horizontal and vertical grinders by Keller Tool.



FOR AIR POWER choose a Gardner-Denver WB Compressor. Other types and sizes available.

GARDNER-DENVER

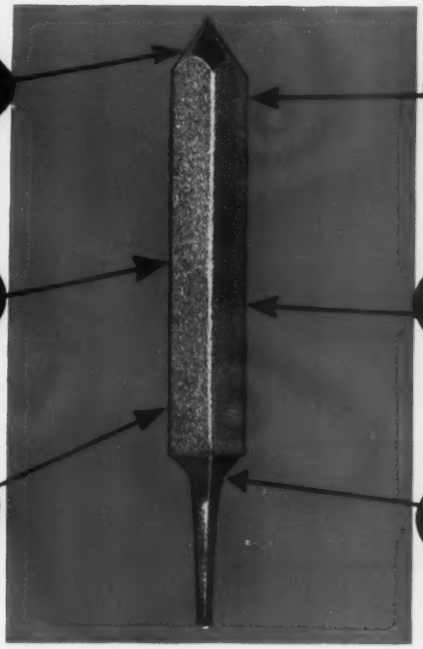
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

GARDNER-DENVER Since 1859 — K KELLER TOOLS

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

fine FANNER SUPERCHILLS

provide casting advantages available in no other chills


Top surface converges upward to a point
No flat horizontal surface to produce "chill kicks" or "blows"
Square section can be placed in a horizontal position, so there is always a sharp surface on top
Cuts down and eliminates risers in many instances
Sufficient volume to insure uniform solidification between center and outer surface
Completely eliminates all "piping" by use of proper size chill

scientifically designed to produce proper chilling at lowest cost

Fanner Superchills are superior in the pouring operation because they are scientifically designed to produce proper chilling without "blows" . . . without "kicking away" . . . without defects. The top surface has a tapered point which is enveloped gradually as molten metal rises in the pouring operation . . . allowing ample time for gases to escape before

Superchill is submerged and fused. (See cross section). The *center section* is square so that the Superchill can be placed in a horizontal position in such a way that there is no flat surface at the top but a corner at all times. Square headed tacks in the core box or on the pattern are used to indicate position. Frequently, when a round chill is used, fusion is not complete, and when drilled, the chill turns with consequent breakage. The square Superchill cannot turn . . . and its corners aid in fusion. If you do not have complete information on these exceptional Superchills, write for details today.

Qualified and specialized engineers in Fanner's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish—both in ferrous and non-ferrous castings. Take advantage of the research and development work that Fanner has invested in this field to improve your profit picture. Simply direct your request to the address shown below.

Fine Fanner Superchills are made in a wide variety of sizes and shapes — uncoated or coppered. They provide better surfaces for molten metal to join with and more chilling volume per pound. They have universal use throughout industry.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK CLEVELAND 9, OHIO

COVER GREATER SURFACE AREA

GET... *Smoother...* *Cleaner...* CASTINGS *at lower cost!*

...WITH DELTA SUPERKOAT WASH

Delta Superkoat Wash is recommended for Steel, Gray Iron, Malleable and Non-Ferrous castings. It's easy to mix and apply uniformly to green or dry sand and baked surfaces by dipping, swabbing, spraying or brushing.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

NOTE THESE IMPORTANT ADVANTAGES OF DELTA SUPERKOAT WASH:

1. **NO PRECIPITATION OR SETTLING —** When thoroughly mixed, wash will stay in suspension indefinitely.
2. **EASY TO APPLY —** It can be dipped, swabbed, brushed or sprayed on green or dry sand and baked surfaces.
3. **RAPID, DEEP PENETRATION & EXCELLENT ADHESION —** Quickly anchors itself 5 to 7 grains deep in sand surfaces.
4. **NON-REACTIVE — LOW GAS —** Will not react or produce gas in contact with molten metal.
5. **REDUCED CLEANING COSTS —** Cast surfaces are smoother and castings are cleaner.
6. **WILL NOT FLAKE —** When completely dried, the wash is thoroughly bonded to the sand surfaces.
7. **HIGHLY REFRACTORY —** Has an unusually high fusion point.
8. **ELIMINATES SAND FUSION AND BURN-IN —** Flowing metal will not crack or rupture wash during pouring.
9. **ECONOMICAL TO USE —** Covers a greater surface area at a lower cost per pound of wash.

DELTA

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

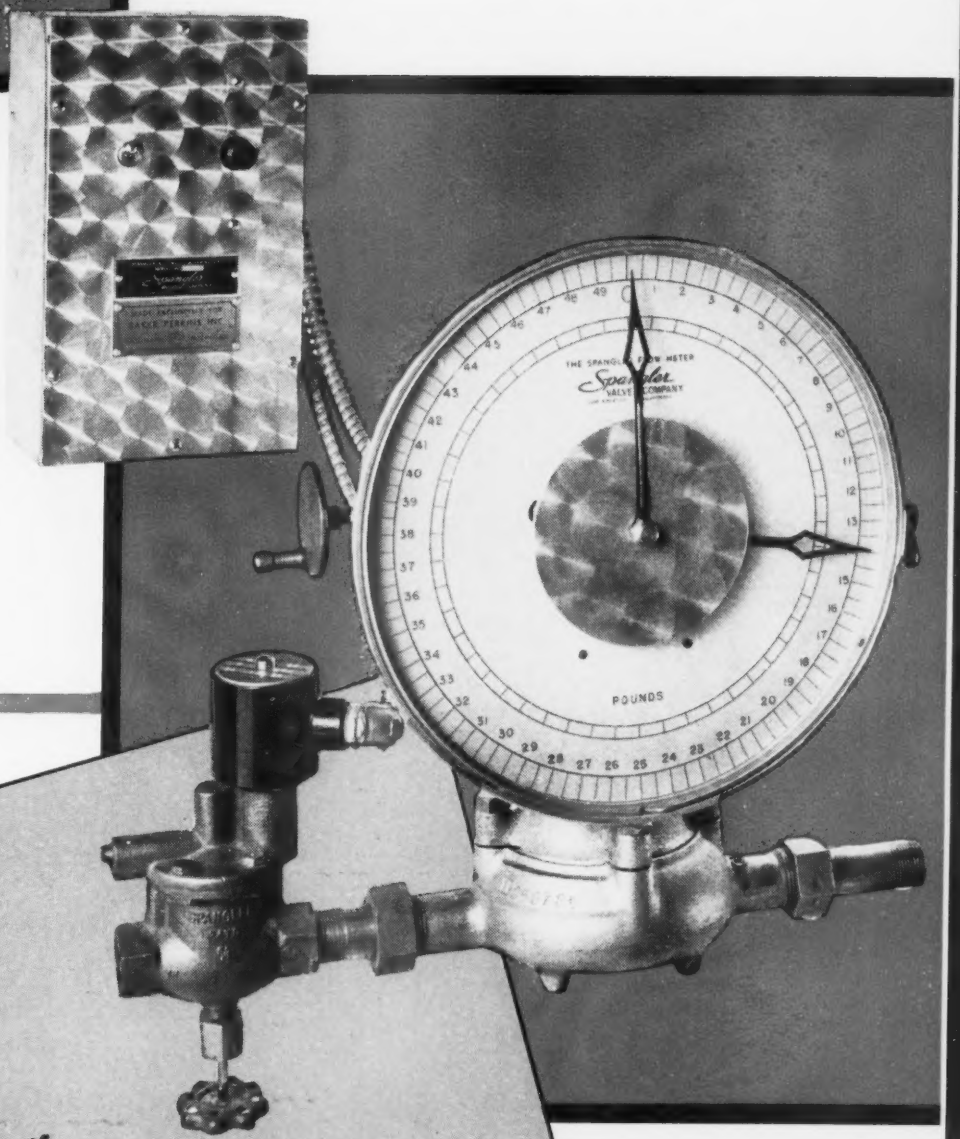
MILWAUKEE 9, WISCONSIN

THE SPANGLER AUTOMATIC LIQUID METER

now exclusive with

BAKER PERKINS

The Spangler automatic liquid metering unit takes the guess work out of your water and oil requirements for batch sand mulling. Good engineering and fine construction make possible exact control of water or oil to Foundry Sand Mixes.

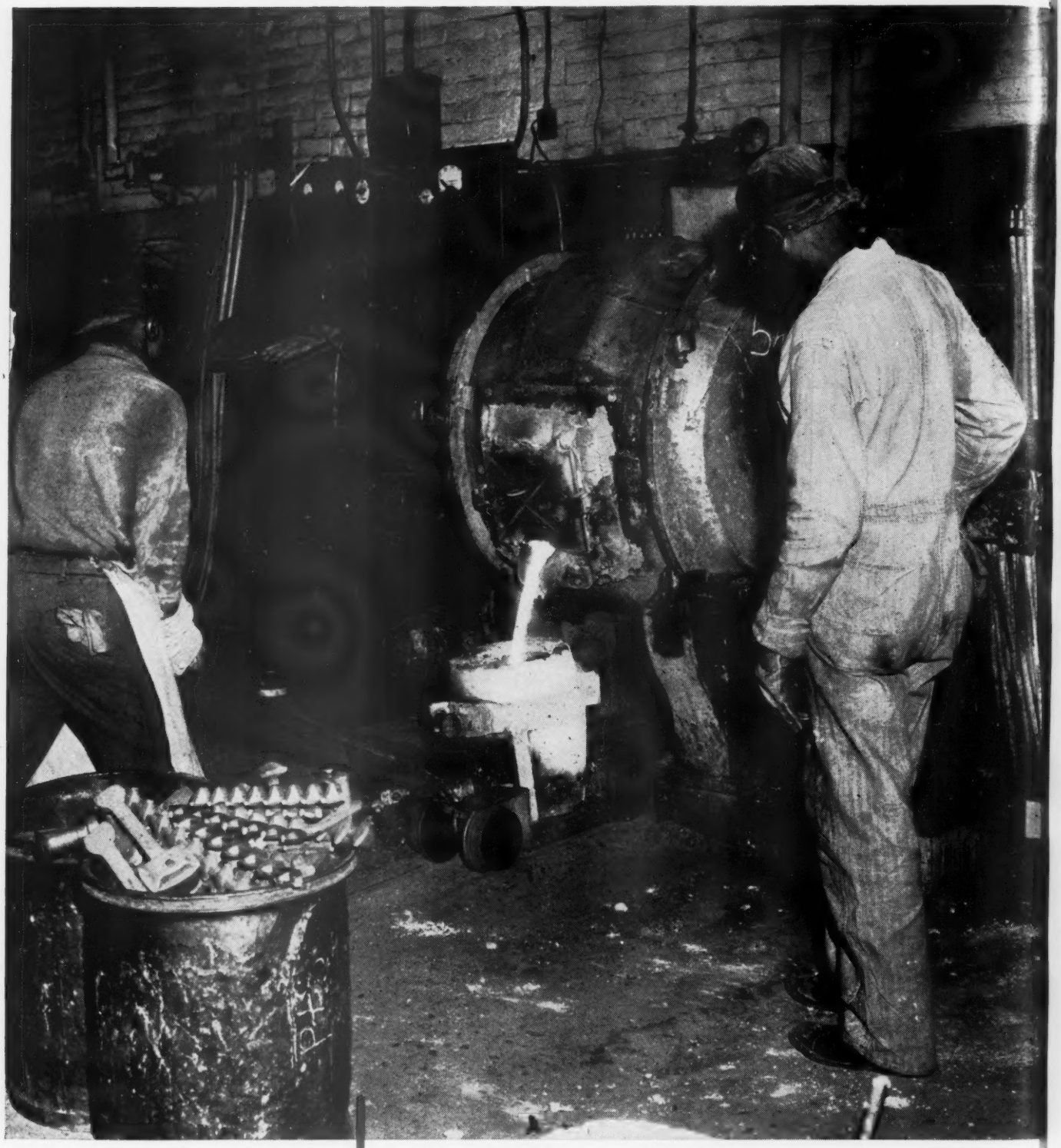


FEATURES

- Accuracy guaranteed to within 1%.
- Delivery volume easily changed.
- Dial can be calibrated in gallons or pounds or fractions thereof.
- Automatic operation.
- Only one moving part.
- Very little space required and meets all water control specifications.

BAKER PERKINS INC.

FOUNDRY SALES DIVISION, SAGINAW, MICHIGAN



Typical Furnace Operating Data

Furnace type LFN, 500 lb., 150 KW rating

Total hours operation	7¼
Total number heats	5
Weight per heat	600 lbs.
Total metal melted	3000 lbs.
Total KWH used	965
Ave. KWH/ton	643
Ave. melt time/heat	54 min.

Refractory life and electrode consumption—(400-600 heats per lining and 8 lbs. per ton of iron melted.)

Ductile Iron Production

In Detroit ROCKING *Electric Furnaces*

Production of this useful, high strength alloy moves along with great efficiency and predictability at Penberthy Injector Company, Detroit. The alloy is prepared in Detroit Rocking Electric Furnaces, 600 lbs. to a heat, a ton and a half per furnace per shift.

Plant production of castings can be scheduled and carried out in an orderly, economical way. The Detroit furnace furnishes molten metal of the desired composition in a set time cycle.

A Versatile Furnace

The Detroit Rocking Electric Furnace, used here for ductile iron, is equally useful in melting other ferrous and non-ferrous metals.

The indirect arc used in these excellent furnaces minimizes carbon pick-up and resulting variations in metal composition. Positive control of temperature, optimum utilization of power are benefits, too.

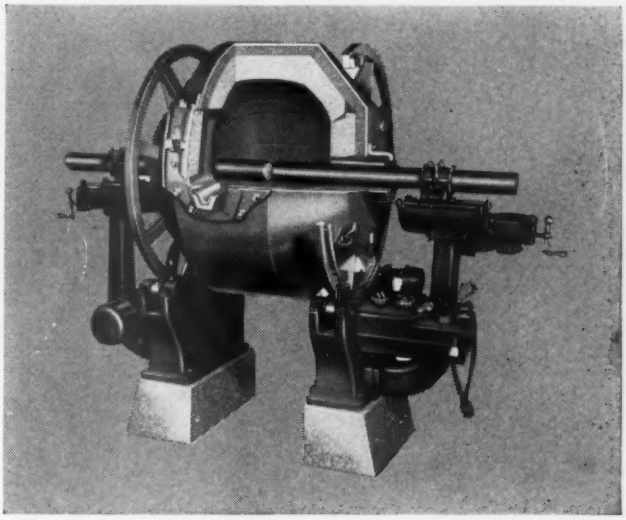
The controlled rocking action helps these furnaces operate with greater economy, since the molten metal washes over and picks up heat from a large area of the refractory. The motion of the metal assures complete homogeneity. Automatic controls, once set, duplicate the most favorable melting cycle time after time.

Get Full Information

With Detroit Rocking Electric Furnaces, you get less metal shrinkage, more usable metal per heat, more uniform product, longer refractory life, simple maintenance and exceptionally long service life.

Send us your operating data. Ask us to tell you how a Detroit furnace can do a better job for you.

Furnace capacities from 10 to 4000 pounds.



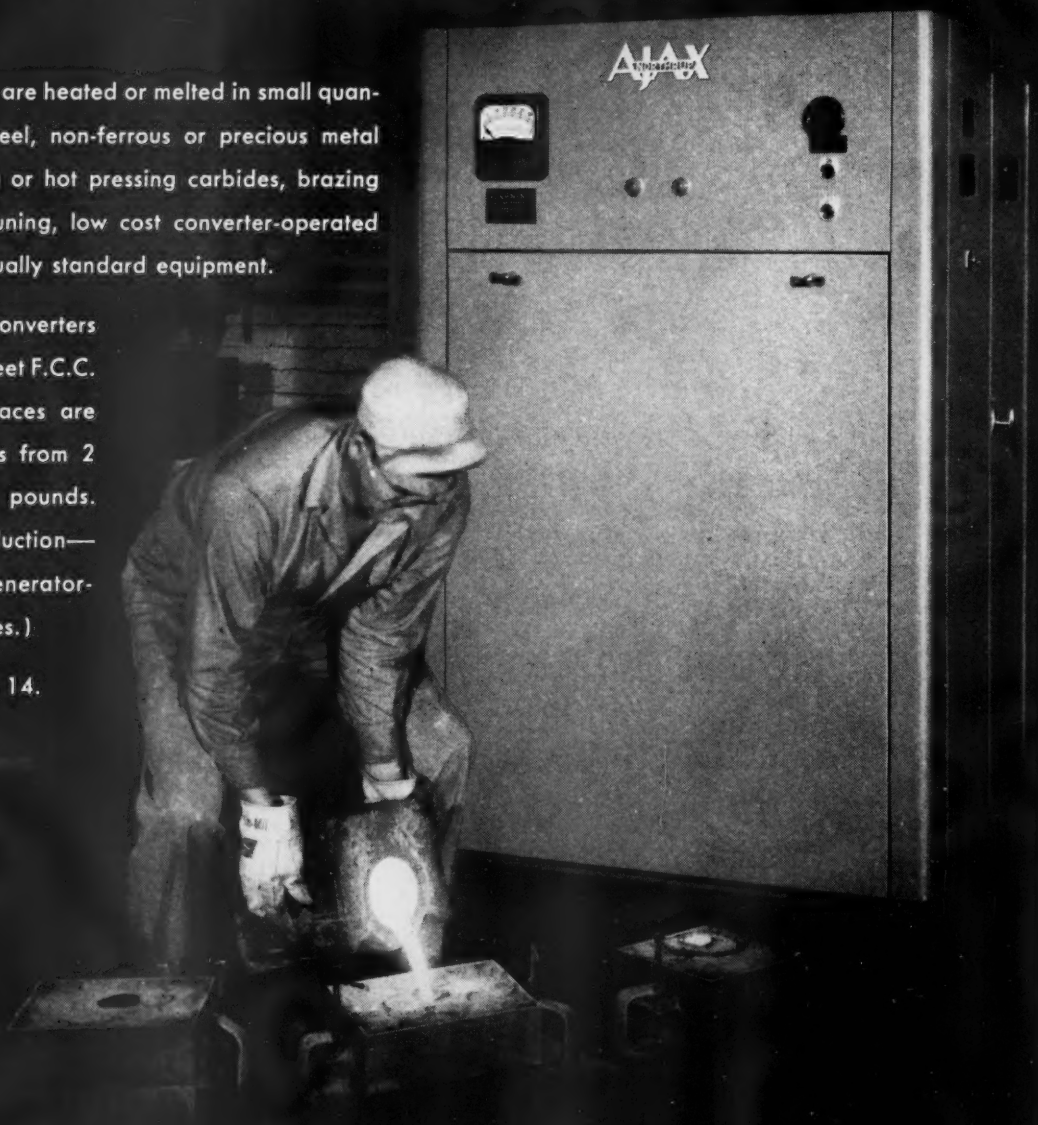
Cutaway view of the Detroit Rocking Electric Furnace, showing engineering and construction features. Rocking action assures maximum heat utilization.

DETROIT ELECTRIC FURNACE DIVISION

Kuhlman Electric Company • Bay City, Michigan

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

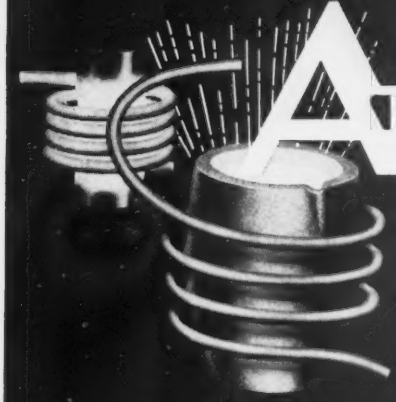
INDUCTION MELTING
with converter-operated furnaces...



Wherever metals are heated or melted in small quantities . . . for steel, non-ferrous or precious metal casting, sintering or hot pressing carbides, brazing . . . these self-tuning, low cost converter-operated furnaces are virtually standard equipment.

Ajax-Northrup converters are certified to meet F.C.C. regulations. Furnaces are available in sizes from 2 ounces to 120 pounds. (For large production—Ajax-Northrup generator-operated furnaces.)

Write for Bulletin 14.



AJAX NORTHRUP SINCE 1916

INDUCTION HEATING-MELTING

AJAX ELECTROTHERMIC CORPORATION • TRENTON 5, NEW JERSEY

Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.

SEE US AT THE METAL SHOW—Booth 1619

Greater Hot Strength...

Globe Dextrines are superior to ordinary cereal binders. Regardless of the heating cycle, Globe maintains surface hardness that resists washing even at high pouring temperatures.

Quick Drying...

This property cuts down oven time, thus increasing oven capacity.

Why GLOBE® dextrines regulate core hardness

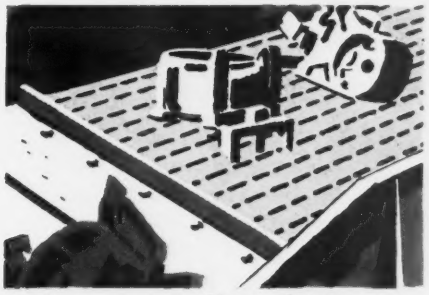
Excellent Permeability...

You reduce costly "blows" and casting losses due to inadequate venting.

The variety of solubilities available in Globe Dextrines enables you to achieve the degree of surface hardness you require. The controlled migrating properties of Globe Dextrines assure you of a smooth, hard surface when you want it and complete burn-out at the proper moment. Globe Brand Dextrines enable you to achieve exactly the collapse rate you desire, thus assuring you of clean castings with close tolerances and a minimum of scrap.

Always available, these uniform dextrines may be obtained in the solubilities you require.

Ask our technical service people how Globe Dextrines can help solve your casting problems. A special new foundry laboratory is ready to serve you. There is no charge or obligation for this service.



Adequate Collapsibility...

Globe burns out at just the proper instant, eliminating strains and hot-tears.

GLOBE

DEXTRINES AND GUMS

CORN PRODUCTS REFINING COMPANY • **17 Battery Place, New York 4, N. Y.**

- *Speeds Curing — 10 times faster than conventional oven baking*
- *Affords 60% Fuel Savings*
- *Produces Smoother Finishes*

SIMPLIFIED OPERATION

"Tell-All" control panel, consisting of meters, lights, buttons grouped at eye level, enables operator to keep on top of the complete operation at all times—to maintain top level production with maximum speed and accuracy.

All the advantages of dielectric baking... *Plus*

EXACT QUALITY CONTROL

Adjustable electrode control permits correct compensation for physical variances in cores — eliminates burning or incomplete baking, even when cores have very thin or thick sections.

- *Frees Storage Area*
- *Eases Shakeout*
- *Improves Working Conditions — cleaner, cooler*

"LOAD MASTER" PROTECTION

Automatic grid control assures correct drive to the oscillator tube regardless of oven load. Automatic conveyor control prevents electrical overload by controlling the belt travel when load is too great for normal operation.

Get all the facts on the *Foundromatic* dielectric core oven. Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 15B7306B.

Foundromatic is an Allis-Chalmers trademark.

EXTRA SAFETY FEATURES

The *Foundromatic* core oven provides greater safety for operator and machine. Metal cabinet is designed to trap radiation. Door safety interlocks remove power when cabinet is opened for inspection.

A-4707

ALLIS-CHALMERS

NOW! Every Core Comes CLEAN

with the NEW CP Core Box Vibrator

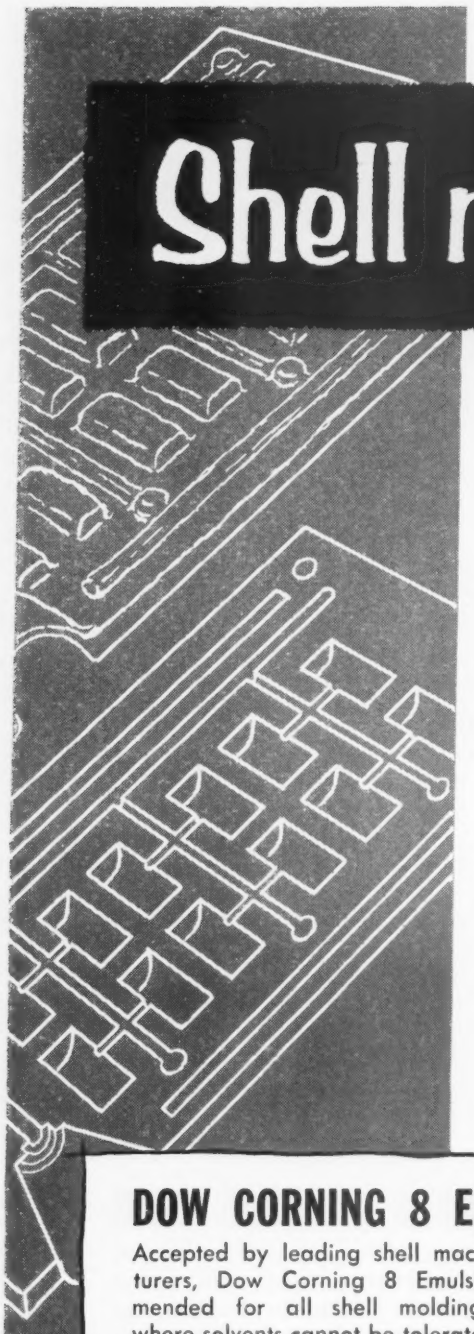
The Air-Powered CP Core Box Vibrator is the newest development in foundry equipment for core and pattern making departments. Cores weighing up to 3000 pounds are freed in less than 90 seconds. No more mallet work or sledging to loosen the core . . . just clamp the vibrator to the inverted box; its 9000 orbital vibrations per minute assure a perfect draw. Cores are free of flaws, damaged edges, distorted sections, dimensional variations . . . boxes remain in condition!

- **Reduces core box maintenance.**
- **Increases core output by eliminating troweling time.**
- **Cores stay true . . . core boxes don't go out-of-square.**

The fast acting air clamp of the CP-219-CBV grabs any cleat up to 6 inches . . . no special adaptors or fixtures are required. Write for details.

Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



Shell molders...

for fast, positive release more continuous production cleaner patterns, lower costs

use Dow Corning Silicone release agents

Shell molding is easier, more accurate and more economical when you use a Dow Corning SILICONE release agent. Especially developed for the metal casting industries, these silicone parting agents give you clean, easy release every time with little or no build-up on even the most complex patterns. Cleaning costs are minimized, and you obtain increased production of shells with uniform dimensional accuracy.

DOW CORNING 8 EMULSION

Accepted by leading shell machine manufacturers, Dow Corning 8 Emulsion is recommended for all shell molding applications where solvents cannot be tolerated. It is easily diluted in hard or soft water, resists creaming or separation—both after dilution and in storage, and is noncorrosive and nonflammable.

DOW CORNING 452 FLUID

A single application of this new solvent type silicone parting agent provides easy release for several resin-sand shells. Easily applied to either hot or cold patterns, Dow Corning 452 rapidly wets the surface and leaves a uniform silicone film that is both heat stable and oxidation resistant.

make your own test
mail coupon today for
free sample

Dow Corning Corporation, Dept. 5910, Midland, Michigan

Please send me:

- ☐ Free sample of Dow Corning 8 Emulsion
- ☐ Free sample of Dow Corning 452 Fluid
- ☐ Free sample of Dow Corning 7 Compound
- ☐ Data on silicone release agents for the shell process.

NAME _____

COMPANY _____

ADDRESS _____

_____

EXTRA for truly effective and lasting pattern break-in use convenient, ready-to-use ***Dow Corning 7 Compound.***

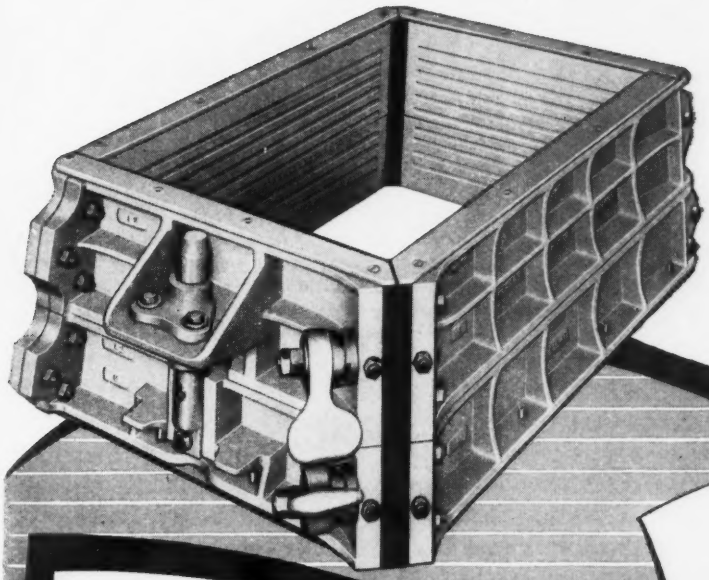
DOW CORNING CORPORATION
MIDLAND MICHIGAN
DOW CORNING SILICONES

ATLANTA CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D.C. (Silver Spring, Md.)

Canada: Dow Corning Silicones Ltd., Toronto Great Britain: Midland Silicones Ltd., London France: St. Gobain, Paris

The Last Word

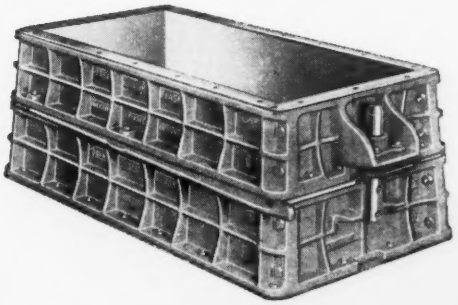
FREMONT SPREADLOCK FLASKS



No sand can lodge in the open corners of Spreadlock flasks. The corner gaps are completely closed by long-life, easily replaceable, live rubber inserts. Made of magnesium, which has twice the tensile strength of aluminum, they afford much longer service and are easier to handle. Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure more exacting work.

PERFECT ALIGNMENT INDEFINITELY!
Guaranteed by the one-inch GROOVLOCK FOOLPROOF PIN on

FREMONT STANDARD SLIP FLASKS



Particularly adapted to cope or drag pattern jobs. Solid, bolted and welded corner construction. Other types of standard pin fittings available.

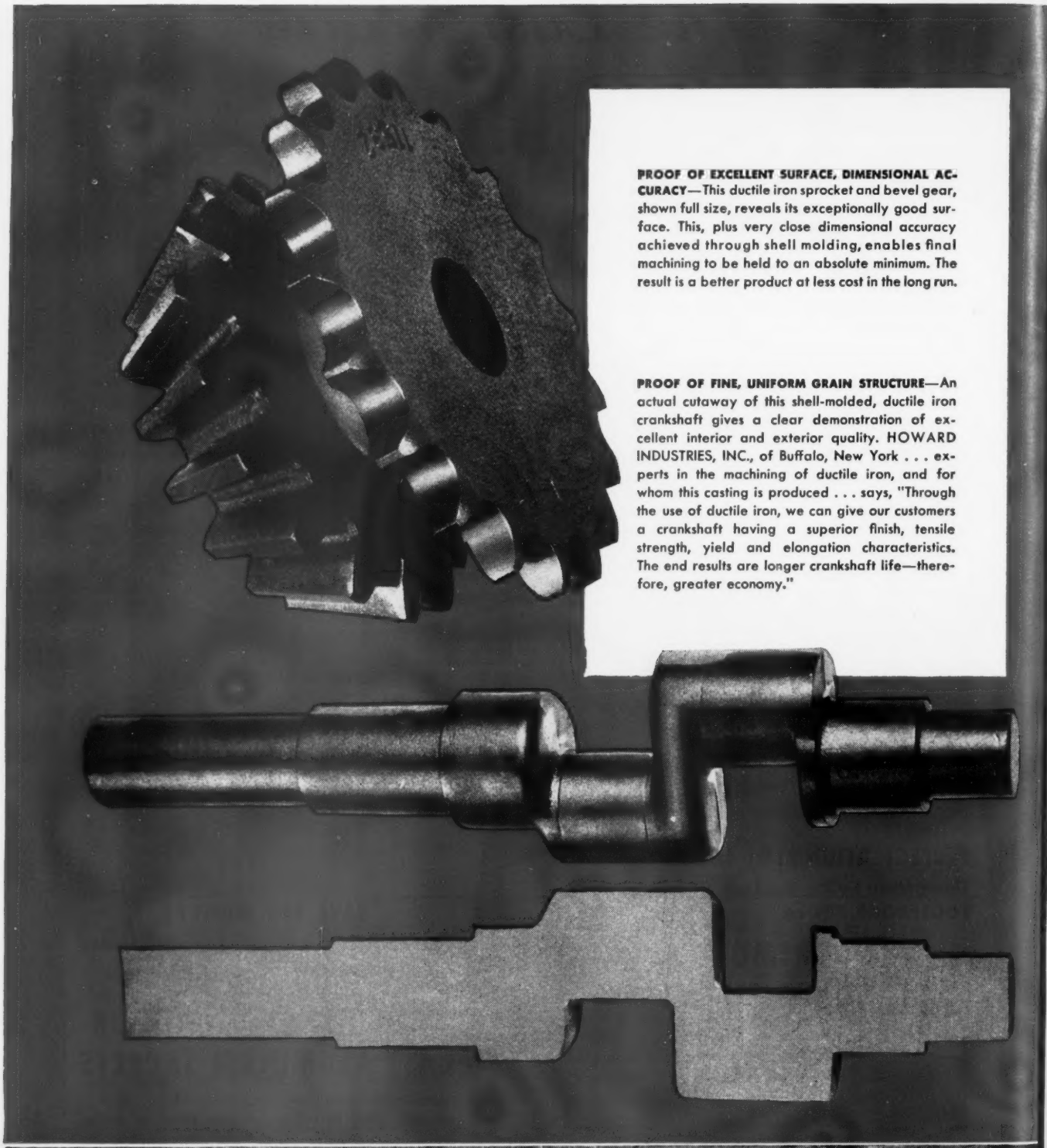
SAVE BIG MONEY!
The precision machined and drilled, bolted corner construction of

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

permits easy insertion of new sides or ends. Entire jacket need not be scrapped. The standard style is designed for ordinary foundry practice, the grooved style, which permits ready gas escape, is ideal for steel foundries. Flasks and jackets can be assembled on 3°, 4° or 5° taper.

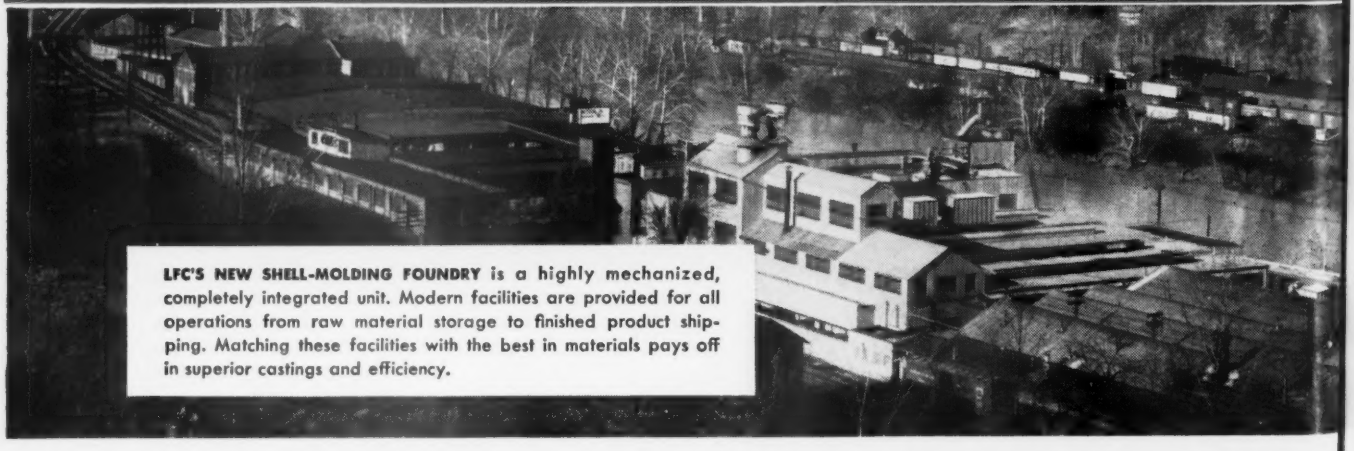
Write today for free literature and prices. All orders given prompt attention.

THE FREMONT FLASK CO.
Fremont, Ohio



PROOF OF EXCELLENT SURFACE, DIMENSIONAL ACCURACY—This ductile iron sprocket and bevel gear, shown full size, reveals its exceptionally good surface. This, plus very close dimensional accuracy achieved through shell molding, enables final machining to be held to an absolute minimum. The result is a better product at less cost in the long run.

PROOF OF FINE, UNIFORM GRAIN STRUCTURE—An actual cutaway of this shell-molded, ductile iron crankshaft gives a clear demonstration of excellent interior and exterior quality. HOWARD INDUSTRIES, INC., of Buffalo, New York . . . experts in the machining of ductile iron, and for whom this casting is produced . . . says, "Through the use of ductile iron, we can give our customers a crankshaft having a superior finish, tensile strength, yield and elongation characteristics. The end results are longer crankshaft life—therefore, greater economy."



LFC'S NEW SHELL-MOLDING FOUNDRY is a highly mechanized, completely integrated unit. Modern facilities are provided for all operations from raw material storage to finished product shipping. Matching these facilities with the best in materials pays off in superior castings and efficiency.

PROOF:

Chateaugay Pig Iron . . . ideal base metal for shell-molded, ductile iron castings

For years, the Lynchburg Foundry Company, Lynchburg, Virginia, has used Chateaugay—Republic's exclusive premium Pig Iron—for castings requiring outstanding high strength, uniformity and machinability. Further, Chateaugay gave them added benefits through its ability to fill adjacent light and heavy sections evenly, plus a fine and uniform grain structure . . . and an exceptionally good surface with high wear-resistance.

Now, with their new shell-molding foundry in production, Chateaugay Pig Iron has proved to be the ideal base metal for Lynchburg Foundry's ductile iron castings, produced by this modern method.

Basically, Chateaugay's very high carbon and unusually low sulphur, phosphorous and manganese content suit it perfectly for ductile iron use. Beyond this, however, its inherently excellent physical properties are maintained in the ductile form, so that LFC is assured of consistent top quality in every casting. Finally, Chateaugay's naturally good surface and uniform shrinkage characteristics enable LFC to maximize, in each casting, the superior surface finish and closer dimensional accuracy advantages of the shell-molding process.

For the complete story on Chateaugay, the low-phosphorous, copper-free pig iron, call in a Republic Pig Iron Metallurgist. There is no cost or obligation for his services. Simply contact your local Republic representative to let us know when you would like him to call.

NEW, AUTOMATIC SHELL-MAKING MACHINE is typical of the up-to-date methods employed in Lynchburg Foundry Company's shell-molding process. Consistent high-quality production of ductile iron castings is assured through the use of Chateaugay Pig Iron as the base metal.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
3104 East 45th Street
Cleveland 27, Ohio

REPUBLIC STEEL ®

☐ Please have a Pig Iron Metallurgist call.

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Company_____

Address_____

City_____ Zone____ State_____

K-3469

Rx for maintaining hot metal schedules

CRYSTOLON* refractories are engineered and prescribed for more continuous furnace operations, both front and back slagging

You can maintain hot metal schedules for your casting line and avoid costly shutdowns by using Norton CRYSTOLON refractories — *engineered and prescribed* for highest efficiency in handling neutral and acid cupola slags.

For back slagging cupolas the Rx is CRYSTOLON slag hole blocks. For capping the notch and lining the slag chute in front slagging cupolas it's CRYSTOLON bricks and cement.

Wherever you use it, this top-quality silicon carbide refractory material will stand up under temperatures as high as 3050°F without softening, spalling or cracking. Its extreme density assures exceptional resistance to slag penetration and attack — and it lasts 5 to 15 times longer than ordinary fire clay.

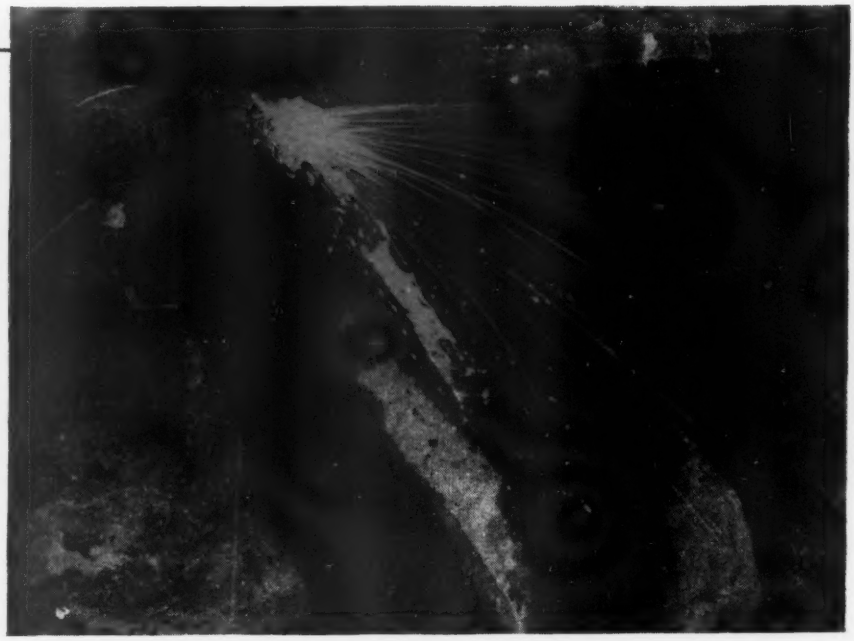
In your own foundry

these advantages mean less maintenance time and trouble for your men — and faster, more profitable metal-melting for *you*. CRYSTOLON bricks and blocks are made in sizes and shapes for every foundry requirement. See your Norton Representative for further facts. Or write to NORTON COMPANY, Refractories Division, 309 New Bond St., Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ont.

NORTON
REFRACTORIES
Engineered... Rx... Prescribed

Making better products...
to make your products better

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

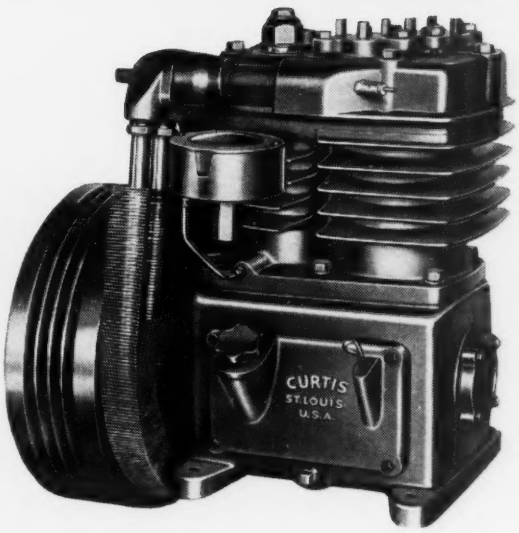


Up to 64 hours of operation without shutdown, under severest back slagging conditions, are reported by users of CRYSTOLON slag hole blocks — like this one, on heavy duty service in a big automotive parts foundry.

More efficient, lower cost metal-melting results when crucial points are guarded by CRYSTOLON refractories — slag hole blocks for back slagging cupolas, bricks and cement for front slagging cupolas.

Cut your costs with *Curtis*

AIR COMPRESSORS
AIR HOISTS
AIR CYLINDERS



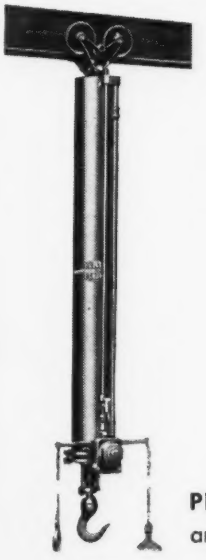
A plentiful supply

of air to speed production throughout your plant is assured with powerful, precision-built *Curtis* Air Compressors.

- **air-cooled, two stage—¼ to 20 H.P. inclusive**
- **water-cooled, single stage—20 to 50 H.P. inclusive**
- **Timken tapered main bearings permit easy external adjustment**
- **long-life pressure-lubricated connecting rod and piston pin bearings**

Tank-mounted compressors in sizes from ¼ through 15 H.P. inclusive (1 to 78 cu. ft.)—also available in base-mounted type.

Simple and base-mounted compressors from ¼ through 50 H.P. inclusive (1 to 300 cu. ft.).

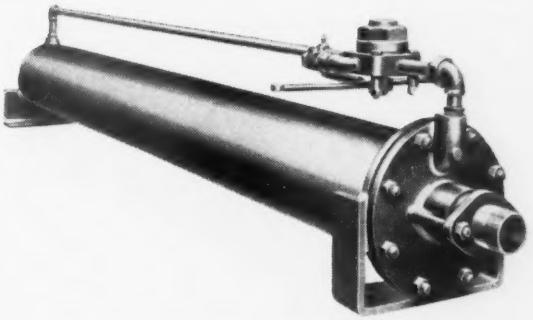


LIFT, LOWER, PUSH or PULL

easily, economically and safely with *Curtis* Air Hoists and Cylinders . . . capacities up to 10 tons.

- **lower initial cost**
- **lower maintenance costs**
- **smooth operation and precision control**
- **self-closing, rotary disc self-grinding valves**

PENDANT AIR HOISTS . . . ideal for any lifting or lowering operation.



BRACKETED AIR CYLINDERS . . . can be mounted horizontally or vertically for lifting, lowering, pushing or pulling.

FOR COMPLETE INFORMATION ON THIS CURTIS COST-SAVING EQUIPMENT . . . WRITE TODAY!

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1922 KIENLEN AVENUE • ST. LOUIS 20, MISSOURI

CM-837

OTHER CURTIS PRODUCTS: Automotive Lifts and High Pressure Car Washers; Commercial and Home Air Conditioning

Use "EM" Ferro-Alloy Briquets for convenient charge make-up and easy handling

CHECK THESE ADVANTAGES

You have a choice of 5 kinds of "EM" briquets—Silicon, Silicomanganese, Ferromanganese, Chromium, and Zirconium.

You have a choice of 3 kinds of shipments to suit your convenience—bulk, packed on pallets, or packed in 250-lb. bags.

Pallets are designed for fast, easy, and safe handling by lift-truck or overhead crane. Pallet shipments reduce your handling costs.

"EM" briquets are easy to handle in the foundry and convenient to use in the cupola charge. No weighing is necessary —just count the number of briquets to obtain the weight needed for the charge.

"EM" briquets are scientifically designed for maximum alloy recovery in cupola melting.

For additional information write or phone the ELECTROMET *office nearest you.*

The terms "EM" and "Electromet" are trade-marks of Union Carbide and Carbon Corporation.

ELECTRO METALLURGICAL COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
OFFICES: Birmingham • Chicago • Cleveland • Detroit
Houston • Los Angeles • New York • Pittsburgh • San Francisco
In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

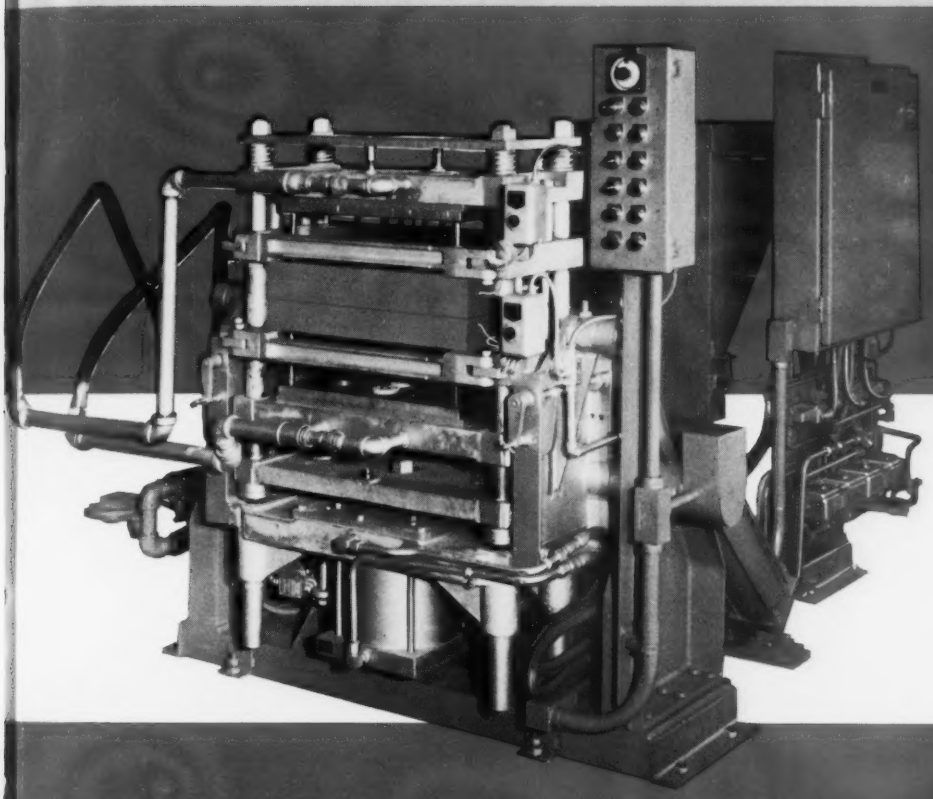
Electromet
TRADE MARK
Ferro-Alloys and Metals

SUTTER

—New—

AUTOMATIC SHELL CORE BLOWER

Gives 50-90 Cycles per Hour



This machine uses heated, split core or mold boxes. Heat to each half is independently controlled. Each section contains stripper pins and plates. Operator's only function is to remove baked cores from the open section of the box.

SUTTER SP-1300

AUTOMATIC SHELL CORE AND SHELL MOLD BLOWING MACHINE

Maximum Box Size—
14" x 24" x 7"

Maximum Draw—3½"

Now, a completely automatic machine that produces smooth, precision shell cores and shell molds, fully cured, at the astounding rate of 50-90 cycles per hour . . . the new Sutter SP-1300. Ample size of this unit permits the use of large, multiple cavity boxes for blowing both solid and hollow cores.

With this machine costly core ovens and driers are eliminated, as are the operating costs of this space-taking equipment . . . there is no rehandling, less breakage . . . and the saving in man-hours is enormous. All of which adds up to more and better cores produced in less time at lower costs on the Sutter SP-1300.

Although only cores have been mentioned, the same advantages apply to shell mold blowing. This versatile, dual-purpose machine was designed to efficiently produce both.

If you want to know all the "whys and wherefores" of this process and equipment, drop us a line and ask for your free technical bulletin No. SP-1300.

See an actual demonstration at our plant.

Creators of foundry equipment with NEW productivity

LITHO IN U.S.A.

SUTTER

PRODUCTS COMPANY

2005 WESTWOOD AVE. • DEARBORN, MICHIGAN

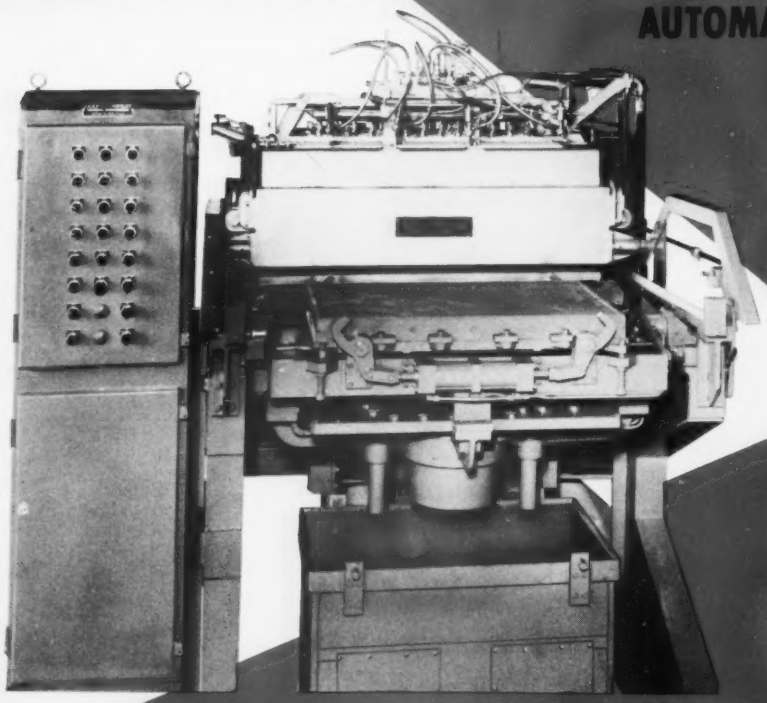
Exclusive Canadian and Overseas Manufacturer and Distributor
FOUNDRY EQUIPMENT LTD.
LEIGHTON BUZZARD, BEDFORDSHIRE, ENGLAND

—Now—

MEET PRODUCTION SCHEDULES . . . LOWER PRODUCTION COSTS | AUTOMATICALLY

NEW, IMPROVED SUTTER SP-1100

AUTOMATIC SHELL MOLDING MACHINE



Maximum Mold Size—26" x 41" x 12" high. Pattern heated internally. Gas or Electrically Heated Oven.

featuring

new *Larger, easily accessible resin bin*

new *Completely electrically controlled*

new *Faster, simpler adjustments for coating and curing time*

plus *All the Sutter advantages that have been proven in foundries throughout the world*

Get your jobs out on time and save money doing it . . . a reality with the new, improved Sutter SP-1100.

Production is increased automatically because this machine automatically produces precision, high quality shell molds at an amazing rate of 40-50 cycles per hour. Production costs are reduced, too, because *one* unskilled operator can efficiently operate *two* Sutter Automatic Shell Molding Machines.

Knowing every job is different, Sutter has designed these machines with adjustable coating and curing times. You can quickly and easily select the proper time for most efficient operation . . . to maintain consistent high quality molds, regardless of the size or shape.

Too, every detail has been designed for economy. For example, pattern plates have integral stripper pins . . . reducing pattern costs, making it possible to change patterns faster. And, for short runs, you can utilize all of the pattern area by using Sutter quick change masks.

Naturally, only the finest materials are used in the careful construction of these units. You are sure of continuous day-after-day service . . . the same well-known Sutter dependability which has been proven in foundries all over the world.

Why not get all the facts? Send for your free Technical Bulletin No. 1100 today. It contains valuable information which shows how to meet foundry production schedules, how to lower costs—automatically.

Creators of foundry equipment with NEW productivity

SUTTER PRODUCTS COMPANY

2005 WESTWOOD AVE. • DEARBORN, MICHIGAN

Exclusive Canadian and Overseas Manufacturer and Distributor
FOUNDRY EQUIPMENT LTD.
LEIGHTON BUZZARD, BEDFORDSHIRE, ENGLAND

FRONTIER 40-E Aluminum Alloy

Improves with Age

FRONTIER 40-E Aluminum Alloy			
TIME AGED	YIELD STRENGTH	TENSILE STRENGTH	ELONGATION
21 days	25,440	34,400	5.1
2 years	31,300	39,300	4.5
2½ years	30,650	39,050	4.5
3 years	29,400	37,900	4.0
4½ years	30,075	38,000	3.75
8 years	31,550	37,025	5.5

The above figures were derived from 12 sample casts made over a period of 8 years. Figures shown are the average of all the samples in each group.

As shown in the table at the right, castings made of Frontier 40-E Aluminum Alloy grow stronger as they age without brittleness or loss of elongation. Yes, parts made of Frontier 40-E actually grow stronger while in use! Frontier 40-E is the outstanding high-strength aluminum alloy, due to a unique metallurgical formula. Frontier 40-E is an aluminum alloy containing zinc with magnesium, titanium, and chromium as added ingredients that result in great strength and absence of brittleness without special and costly heat treatment. It has been proven by extensive tests that "40-E" reaches stability at room temperature. After this stabilization has taken place there is little further change either to increase or decrease physical values. Frontier 40-E Aluminum Alloy is also Shock Resistant; Corrosion Resistant, even under stress; has excellent machineability; is fine grained for Pressure Tightness.

Technical advice and service is available to designers and licensees.

Please send me a copy of the Alloy Data Book giving engineering and metallurgical facts on the physical properties of Frontier "40-E".

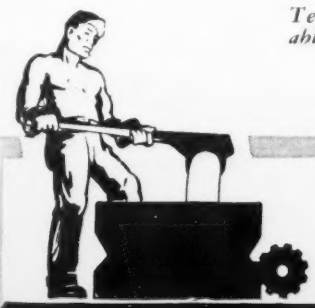
Name.....

Company.....

Address.....

City.....

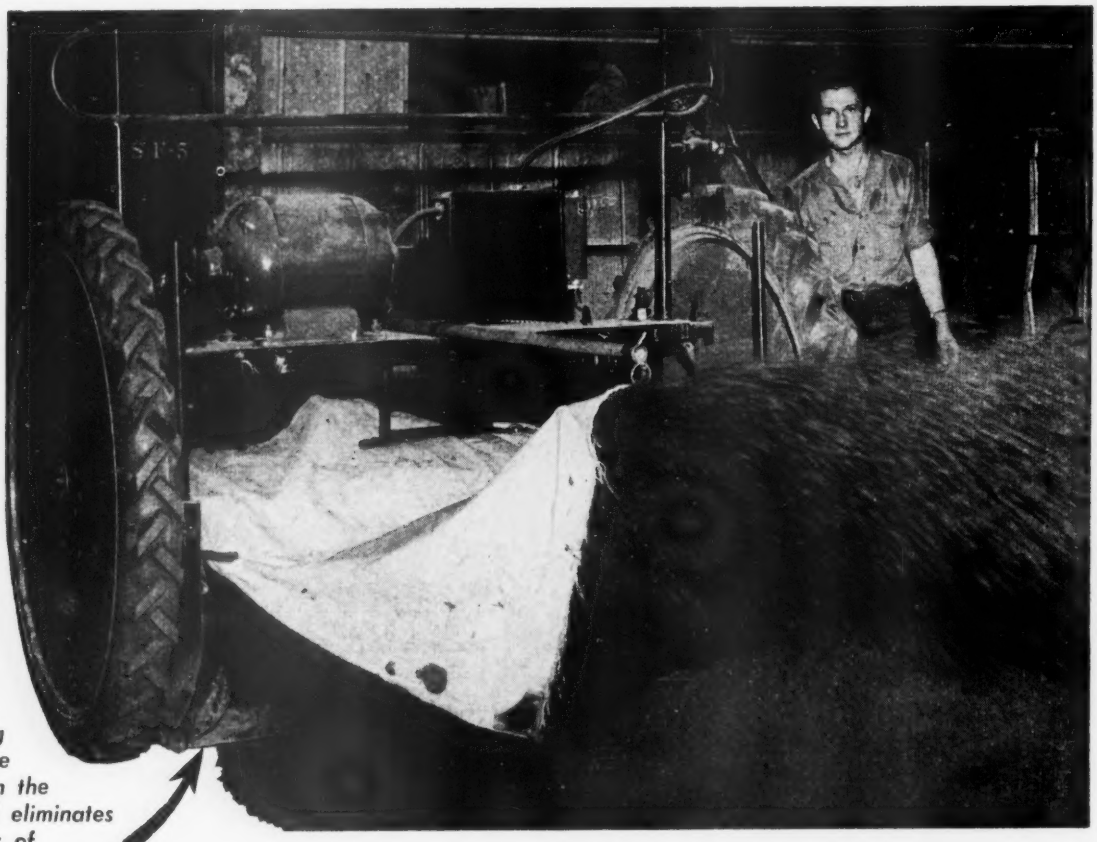
State.....



FRONTIER BRONZE CORPORATION

4878 PACKARD ROAD, NIAGARA FALLS, NEW YORK

DOES BETTER CONDITIONED SAND MEAN BETTER CASTINGS TO YOU?



This drag scoops the sand from the floor and eliminates any layer of unconditioned sand

This Moulders' Friend was rolled off a truck on to the floor of a North Carolina foundry where it conditioned all of the moulding sand without any rearrangement of the heaps. The Moulders' Friend will fit your foundry too.

THE MOULDER'S FRIEND GIVES YOU THOROUGHLY CONDITIONED SAND

The thousands of flat tempered steel wires in the brush revolving at high speed pick up small particles of used sand, added bond and moisture and blend them thoroughly. This process is so thorough that either clay bond or new moulding sand is blended with the heap successfully and a minimum of moisture is required. A portable screen and water dispenser are valuable added features.

THE BRUSH DOES THE JOB

●

THE MOULDER'S FRIEND SAVES MONEY . . .

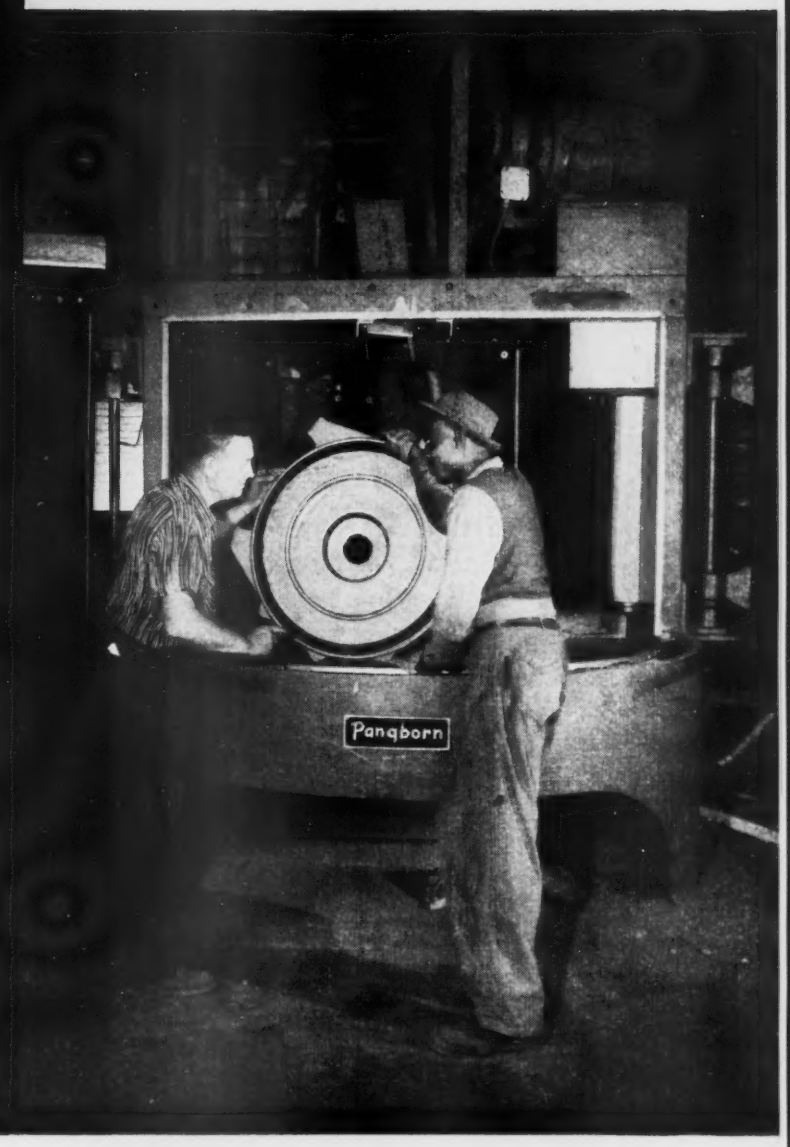
capacity two tons per minute—one man operation — simple construction — easy to buy and use—pays for itself with better castings and labor saved.

Investigate The Moulders' Friend today. See one in operation.

"The Moulders' Friend"
Dallas City, Illinois

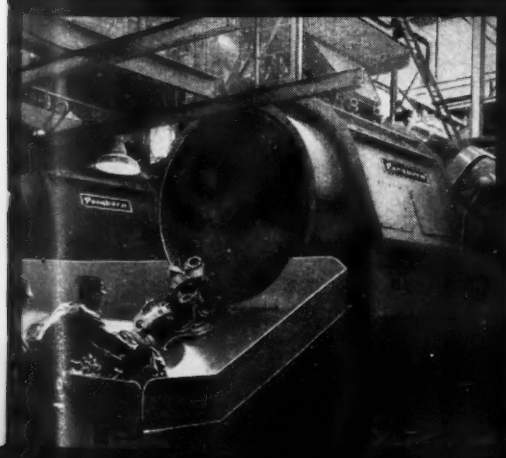
Pangborn Rotoblast® gives you

lower cleaning costs per ton!



Pangborn Rotoblast gives you lower cost per ton of castings cleaned because it cuts working time, does a thorough cleaning job quickly. *Lower cost* because you save on labor . . . because Rotoblast requires less power to operate. Whether your requirements call for one of the machines shown here—a Pangborn Blastmaster, Table-Room, or Continuous-Flo Barrel—or one of the other machines in the Pangborn line, Pangborn Rotoblast can save you money! See for yourself—write for Bulletin 227 to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

*U. S. Pat. #2184926 (other patents pending)



Pangborn

BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

Rotoblast Tables & Table-Rooms

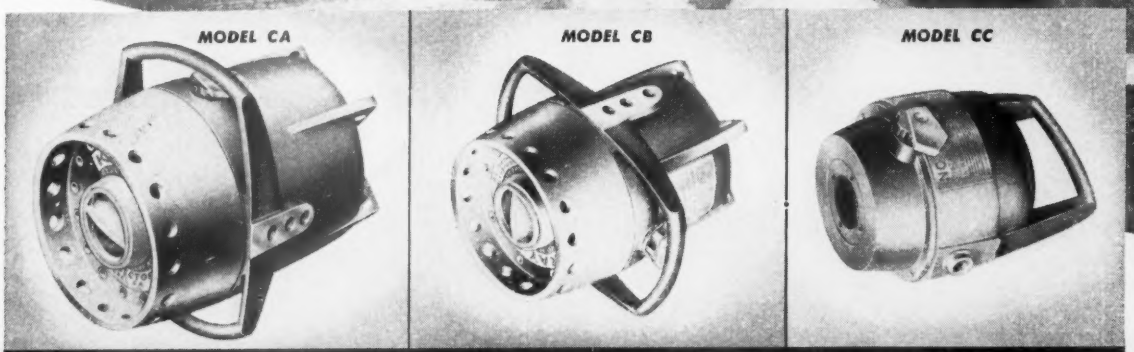
Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Malleabrasive* Shot & Grit

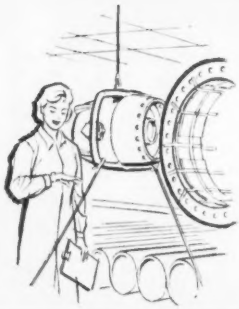
presents the KEL-RAY® Projector*

A safe versatile tool for Radiography with gamma rays . . .



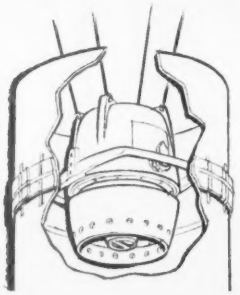
Depending on the projector model and service requirements either encapsulated Cobalt 60, Cesium 137 or Iridium 192 is used as the gamma ray source.

NON-DESTRUCTIVE INSPECTION and TESTING



SAFE

KEL-RAY projectors have extremely low radiation leakage. So low they can be shipped and stored without additional shielding. They are tamper, fire, and shock proof. Operated under prescribed procedures, leakage is below the AEC limit.

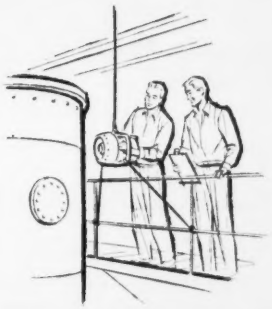


VERSATILE

A single set-up can produce either spot, doughnut, or hemisphere panoramic radiographs. Thick steel sections can be radiographed; sensitivity is so great even incandescent lamp filaments have been radiographed with a KEL-RAY projector.

CONVENIENT

Designed for field or shop use, the smallest model can be carried by hand—largest is transported and positioned speedily with standard equipment for materials handling and rigging.



ECONOMICAL

Initial and operating costs are low. No delicate parts to pamper or adjust . . . no expensive electrical power source required. Minimized overall set up and exposure time provide further savings.

Each of the three KEL-RAY Projector models is a portable, powerful, shielded, self-contained source of penetrating radiation for non-destructive inspection in maintenance, construction or quality control. There is a KEL-RAY Gamma Ray Projector that can improve your operations —save you time and money! Write for detailed literature.

Trade Mark of The M. W. Kellogg Company

** Sold exclusively by Metal & Thermit Corporation. Designed and manufactured by The M. W. Kellogg Company.*

METAL & THERMIT CORPORATION

100 EAST 42nd STREET • NEW YORK 17, N. Y.

TACCONE DIAFORM MOLDING MACHINE

makes available now to every foundry

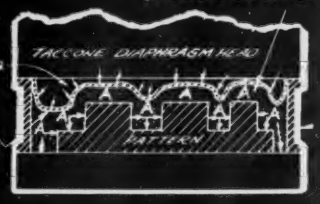
- ☆ High Pressure Molding
- ☆ High Speed Operation
- ☆ Low Machine and Pattern Equipment Maintenance

TACCONE PRINCIPLE

Pressure surface of diaphragm on sand is approx. 40% greater than the area of the flask

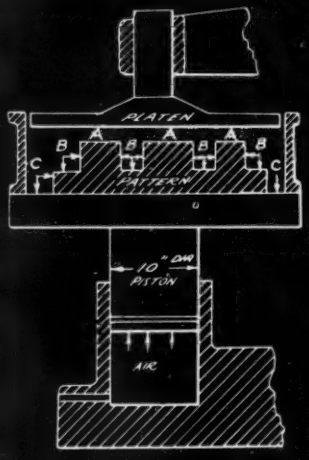
Flask size = 12" x 18"
Area = 216 sq. in.
216 + 40% = 302 sq. in.
302 sq. in. x 80# line pressure = 24,160#

24,160 pounds total pressure on sand



A—DENSITY OF RAM ESSENTIALLY IDENTICAL AT ALL POINTS

80 LB. LINE PRESSURE



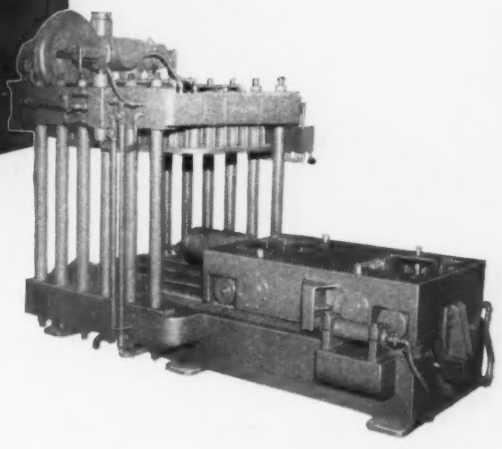
CONVENTIONAL SQUEEZE

A—HARD RAM
B—MEDIUM RAM
C—SOFT RAM

6,280 pounds total pressure on sand

Area of 10" dia squeeze piston = 78.5 sq. inches. 78.5 x 80# line pressure = 6,280#

- HIGH PRESSURE MOLDING
- PRECISION CASTINGS
- LOWER PATTERN COST
- FASTER MOLDING
- LESS FLASK MAINTENANCE
- MOLD HARDNESS CONTROL
- UNIFORM MOLD HARDNESS
- LOWER COST MOLDING
- LESS AIR CONSUMPTION



Write for new folder

"Taccone Diaform Molding Machine"

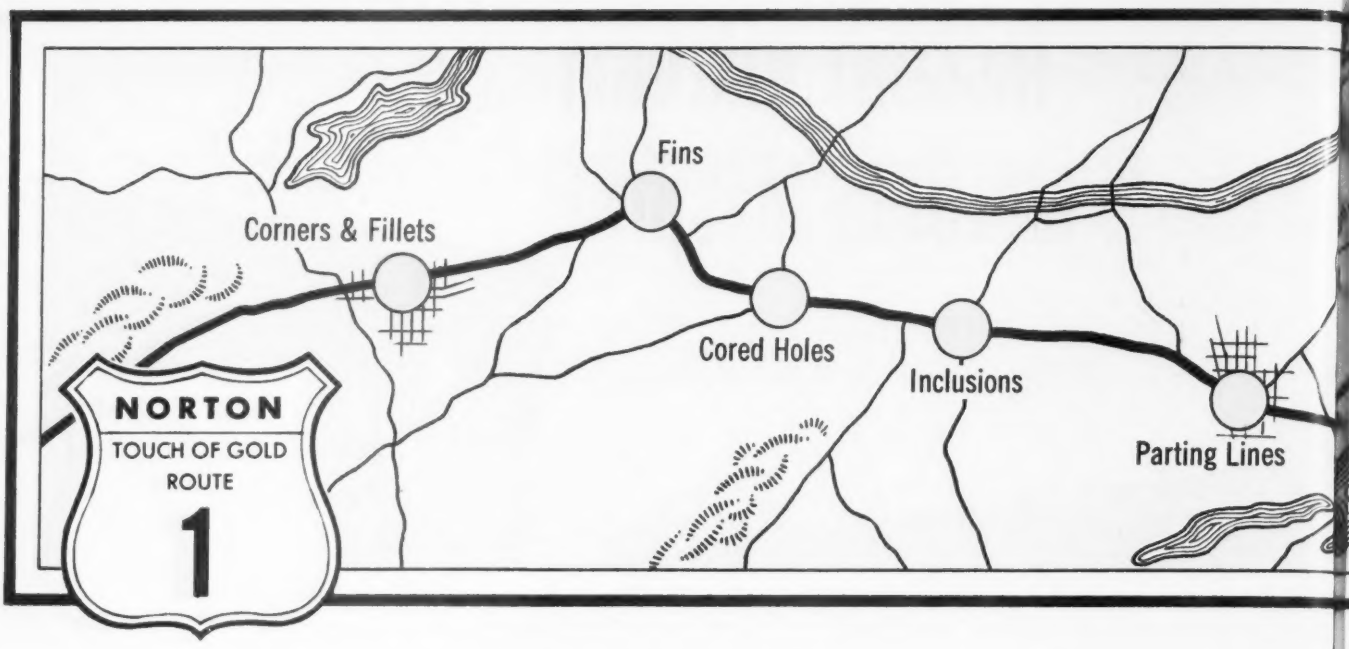
International Minerals & Chemicals

EASTERN CLAY PRODUCTS DEPT.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago, 6

DIXIE BOND • BLACK HILLS BENTONITE • TRIPLACT • REVIVO CORE PASTE • REVIVO BOND • BONDACTOR • CUPOLINE • DURA PRODUCTS • WESTONITE



Snagging In Hard-to-Reach Places?

Take the time-and-money-saving "TOUCH of GOLD" Route ... with NORTON MOUNTED WHEELS AND POINTS

In Norton mounted wheels and points you get the same top quality materials and expert manufacturing methods used in building all Norton wheels.

You also get the benefit of *special* processes that make these small items the biggest values of their type — real "Touch of Gold" performers that grind better, last longer and save more on hundreds of jobs. For example:

Special Mounting. Norton-developed mounting techniques insure exceptional holding strength, that keeps wheels TIGHT on their spindles, even under severest conditions.

Special Truing. Norton's method of truing mounted wheels and points on their own spindles results in: (1) perfect concentricity; (2) sharpness and fast-cutting action; (3) accuracy of dimensions and shape. They are ready to go to work immediately.

Special Quality Control. That's *statistical* quality control, which provides identical duplication from lot to lot and assures you top performance each time you re-order the same specifications.

The Line Is 100% Complete

Norton mounted wheels and points come in nearly 200 standard shapes and sizes, for grinding all metals. You can get them in ALUNDUM* or CRYSTOLON* abrasives, in vitrified or resinoid bonds, and in the laminated, semi-flexible BF type construction.

See Your Norton Distributor

for the mounted wheels and points that will bring the value-adding, cost-cutting "Touch of Gold" to your hard-to-get-at grinding jobs. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

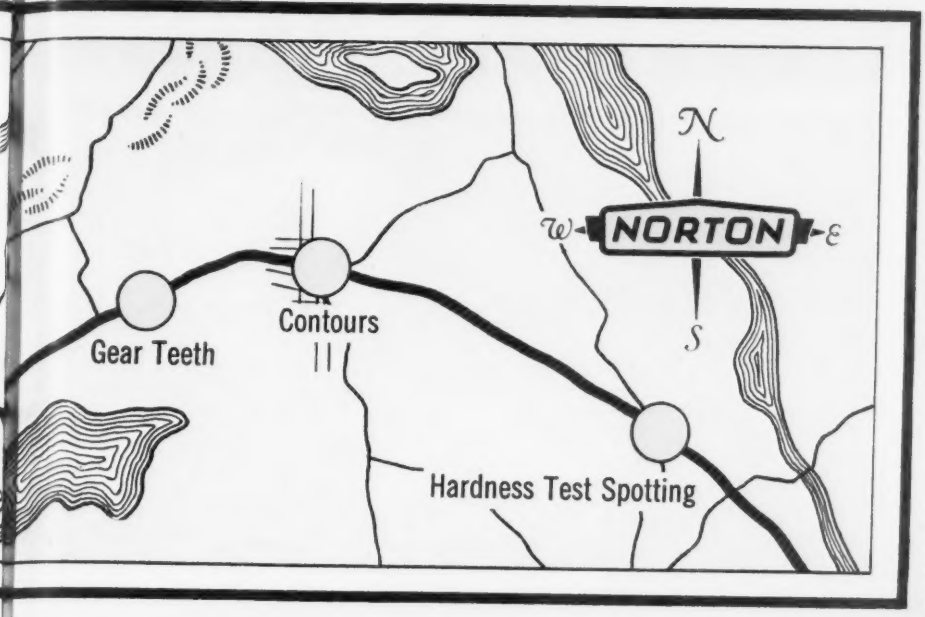
W-1655

NORTON

Making better products... to make your products better

and its BEHR-MANNING *division*

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes


N
W
NORTON
E
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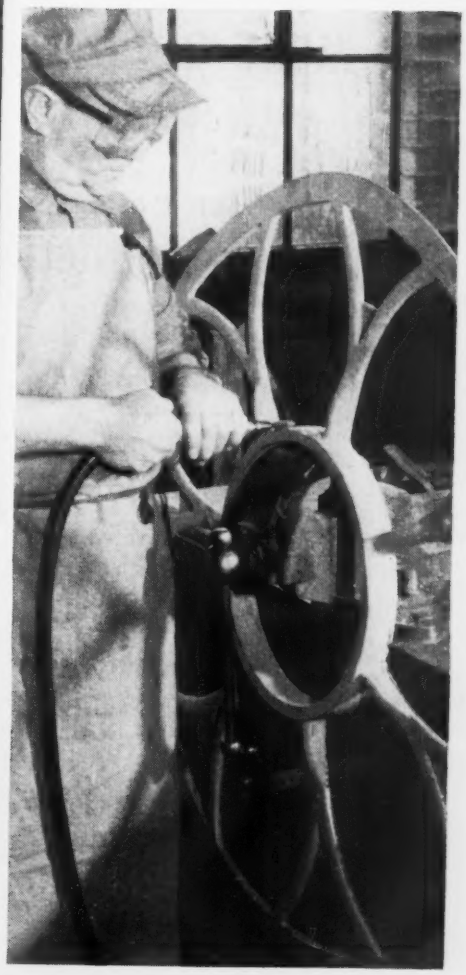
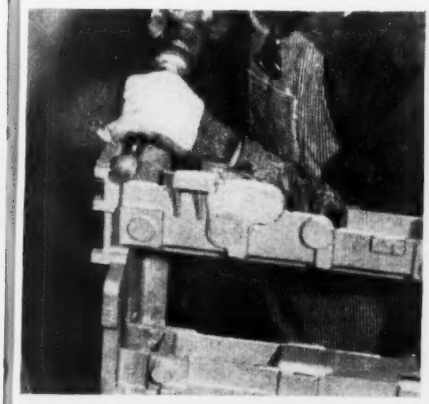
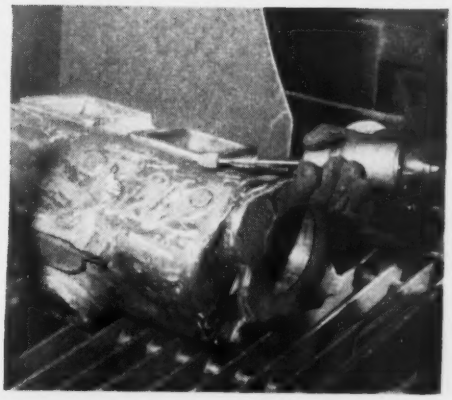
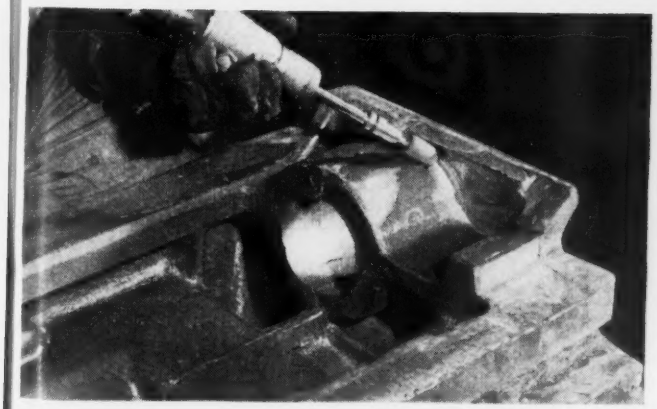
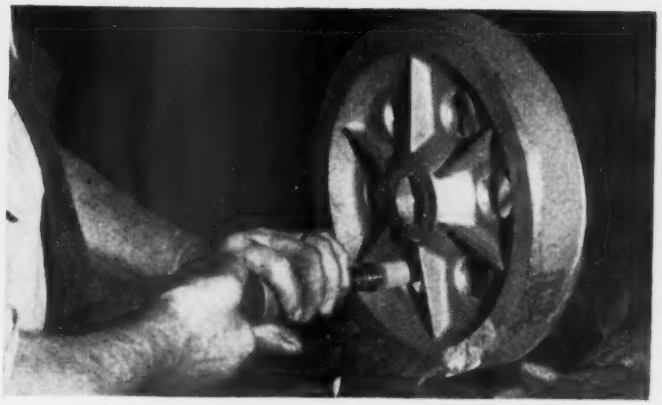
Contours
Gear Teeth
Hardness Test Spotting











HOW TO BUY PORTABLE WHEELS

FOR MORE OUTPUT PER MAN-HOUR

"More Use per Dollar"

Look for a company that will engineer wheels specially to meet *your* specific requirements . . . to remove *more* metal, *faster*—at lower cost. Be sure that each type—flared cup, cone or plug and mounted points, as well as straight wheel—is bonded for its particular application and speed.

Select only the most efficient portable wheel for *your* job . . . one that combines fast cutting action with long wheel life. The type of abrasive and correct grain size should be determined by the rate of metal removal and finish your operations require. Only the right rubber or resinoid bond permits the cutting grains to do a uniform quality job at top speed. A careful analysis of these factors as they affect *your* snagging problems can best assure more pieces done per hour with your portable grinders . . . less operator fatigue and lower production costs at your plant.

Specify by name the portable snagging wheels engineered with *your* job in mind . . . specify Manhattan Portable Wheels.

MANHATTAN PORTABLE WHEELS

Individual engineering for every customer is the secret of success in Manhattan Portable Wheels for portable grinders. Every phase of the wheel you buy—type of abrasive, grain size, hardness, structure and bond—are determined by the specific requirements of your work. They are built to solve the problems at your plant . . . to remove more metal . . . faster . . . at low cost. They satisfy workers on incentive who want speed, as well as management men who want uniform quality production.

Let a Manhattan representative show you how you can get more output per man-hour and lower production costs . . . "More Use per Dollar" . . . with Manhattan Portable Wheels and other types of high speed, heavy duty abrasive wheels.

RM-542

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

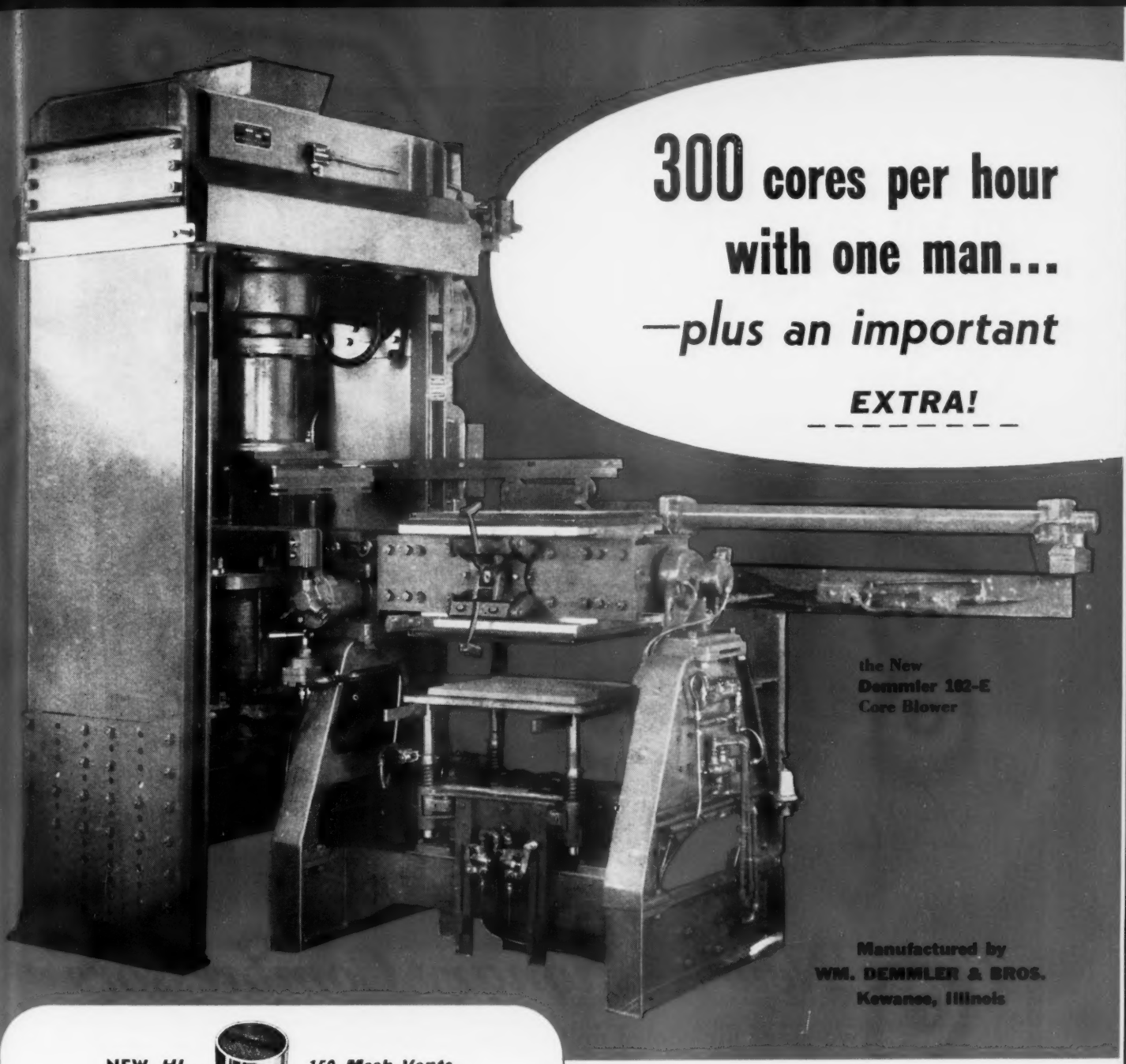
RAYBESTOS-MANHATTAN, INC.

Flat Belts · V-Belts · Conveyor Belts · Hose · Roll Covering · Tank Lining · Abrasive Wheels

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

300 cores per hour with one man...

—plus an important EXTRA!



the New
Demmler 102-E
Core Blower

Manufactured by
WM. DEMMLER & BROS.
Kewanee, Illinois

NEW *HL* ***150 Mesh Vents***

PRECISION CORE BOX VENTS

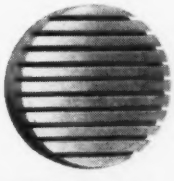
Demmler is also your best source for core box vents, built by specialists who know the importance of adhering to specifications. Many different diameters, slot widths, or screen meshes including the special 150 mesh stainless steel type for D-process shell molding. Write for literature on Demmler vents.

TYPE L —
Lectromesh Vent

TYPE B —
Perforated Vent

TYPE A —
Perforated Vent

TYPE H —
Screen Vent



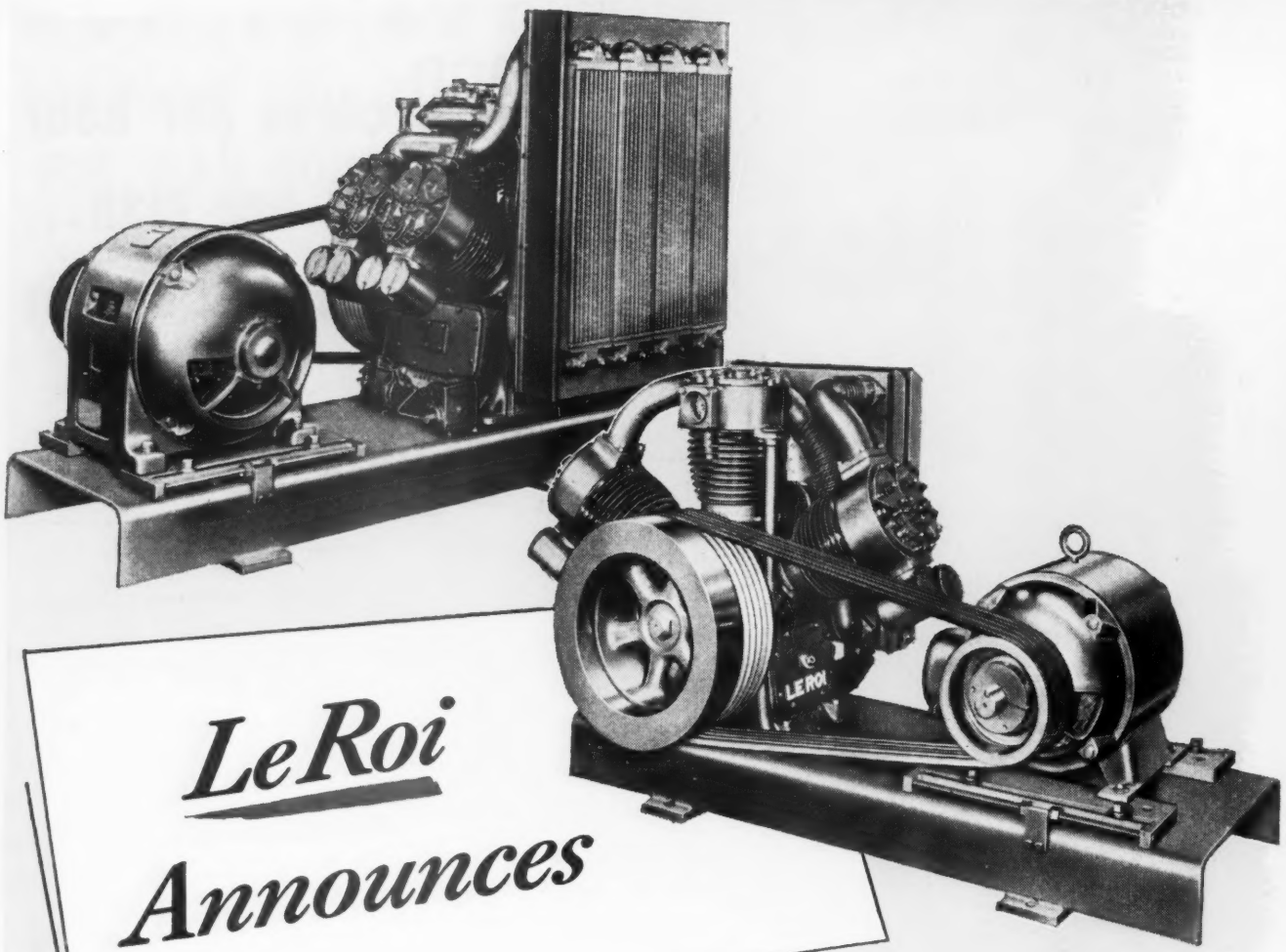
TYPE C —
Steel Slotted Vent

TYPE D —
Brass Slotted Vent

Demmler Core Blowers lead the trend to automation with the highest production records. But, they can offer your foundry an important *extra*, too! They also hold the record for low maintenance!

Shown above, the Demmler 102-E Stationary Sand Magazine, Fully Automatic Core Blower pictured with the No. 6 double core-roll-over draw machine and core box shuttle. This production pacer will blow, draw, roll-over and draw cores at a production rate up to 300 per hour with one man operation! And, still offers Demmler-low maintenance that customers repeatedly say is lower than other types in actual tests.

That's why a Demmler Core Blower is a good investment. And, as operations change, your Demmler Core Blowers are flexible enough to be adapted for new jobs. This flexibility and rugged design acacounts for the fact that many Demmler Core Blowers are still in service after 40 years of duty. It's easy to consult a Demmler engineer and you will be units ahead in production, dollars ahead in maintenance savings!



LeRoi Announces

Three New Stationary Compressors

Two-stage air-cooled units in 50, 75, and 100 hp. sizes having 200, 330, and 440 cfm capacities at 125 lbs. pressure

Now, Westinghouse Air Brake Co., through its Le Roi Division, adds three new compressors to its stationary line, giving you a size range from ½ to 100 hp. Built to give you years of service, these new compressors are designed to provide you with many important benefits—benefits that mean low-cost air for your plant, mine, quarry, ship, or construction job.

Low-cost operation — Good mechanical and compression efficiency resulting from 2-stage compression and intercooling keeps power costs to a minimum. Moreover, since these new Le Roi's are air-cooled, cooling-water cost is eliminated and attention on the part of the operator is greatly reduced.

Low-cost installation — Compact size reduces headroom and floor space requirements. Again, air cooling eliminates the need for water and water piping so that you can install these units practically anywhere with no fear of freezing. Minimum vibration and light weight lets you bolt them to a substantial floor and save on foundation costs.

Low-cost maintenance — All valves are interchangeable, both intake and discharge. Shrouded-type intercooler and large air passages promote longer valve life. No anti-freeze is required and there are no cylinder jackets or intercooler water passages to clog or scale. Forced-feed lubrication supplies oil under pressure to all moving parts and a sight-level oil gauge keeps the operator posted on the oil supply. The crankshaft is suspended on taper roller bearings that seldom need adjustment, and all parts are easily accessible.

Dual control is standard equipment and permits either constant-speed or automatic start-and-stop regulation. Here's a practical answer to low-cost air supply. Write for our latest literature.

SC-100

LE ROI Division of Westinghouse Air Brake Co.

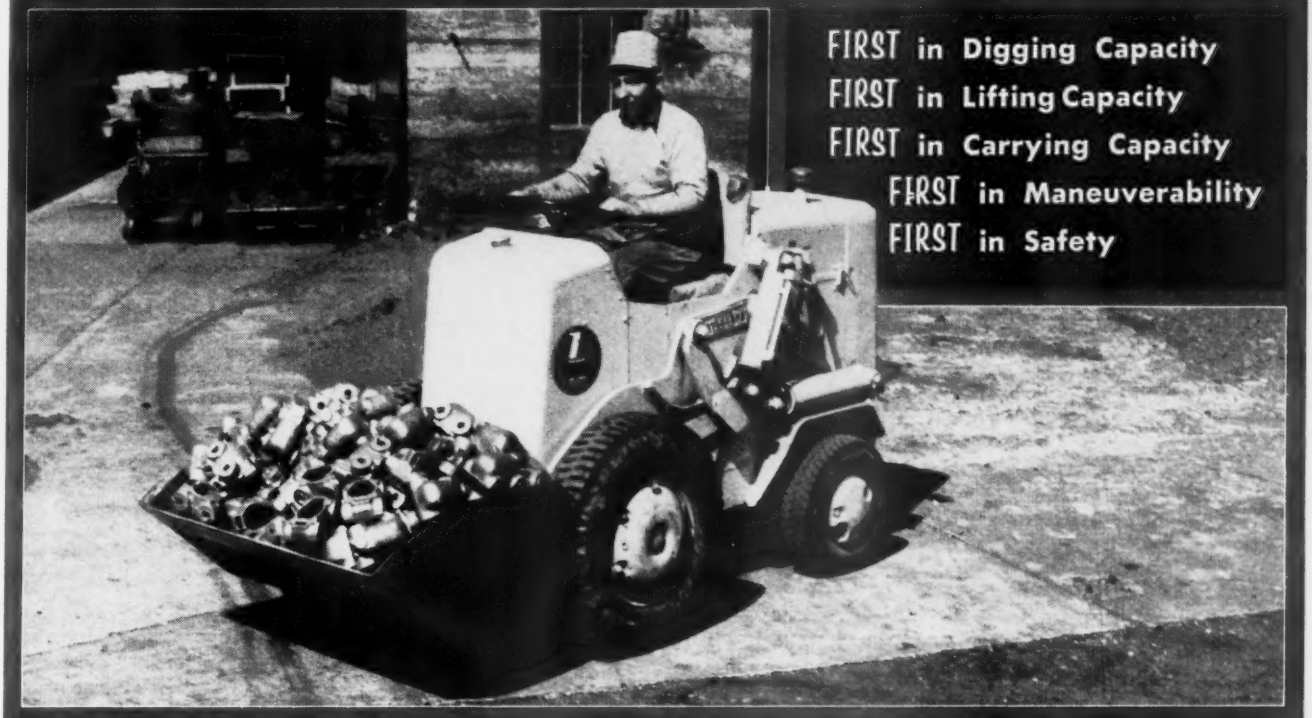
MILWAUKEE 14, WISCONSIN

Distributors in all principal cities

FIRST in Performance
because it's
FIRST in Design

New Model HA PAYLOADER® Tractor Shovel

with 40 degree bucket tip-back and powerful break-out action



FIRST in Digging Capacity
FIRST in Lifting Capacity
FIRST in Carrying Capacity
FIRST in Maneuverability
FIRST in Safety

The 1955 Model HA "PAYOADER" has gone to work in all kinds of manufacturing and processing plants and has already proven that it is a production champion. It has an 18 cu. ft. bucket — the biggest capacity in its class — and an amazing new bucket action. Long-time "PAYLOADER" users as well as new owners report new highs in production and new lows in bulk-material handling costs with the new HA.

They praise the 40 degree bucket tip-back at ground level that digs heaped bucket loads easily — up to a ton in weight — and carries them close and low for fast, safe transport without spillage. They like the increased power, the ease and speed of operation that comes from torque converter drive, easy steering and powerful hydraulic brakes.

Your PAYLOADER Distributor is ready to show what the new HA can do on *your* bulk-material handling work.

☐ Send data on Model HA (18 cu. ft. bucket capacity)
☐ On larger 2-wheel drive models
☐ On larger 4-wheel drive models
☐ On "PAYLOADER" towing tractors

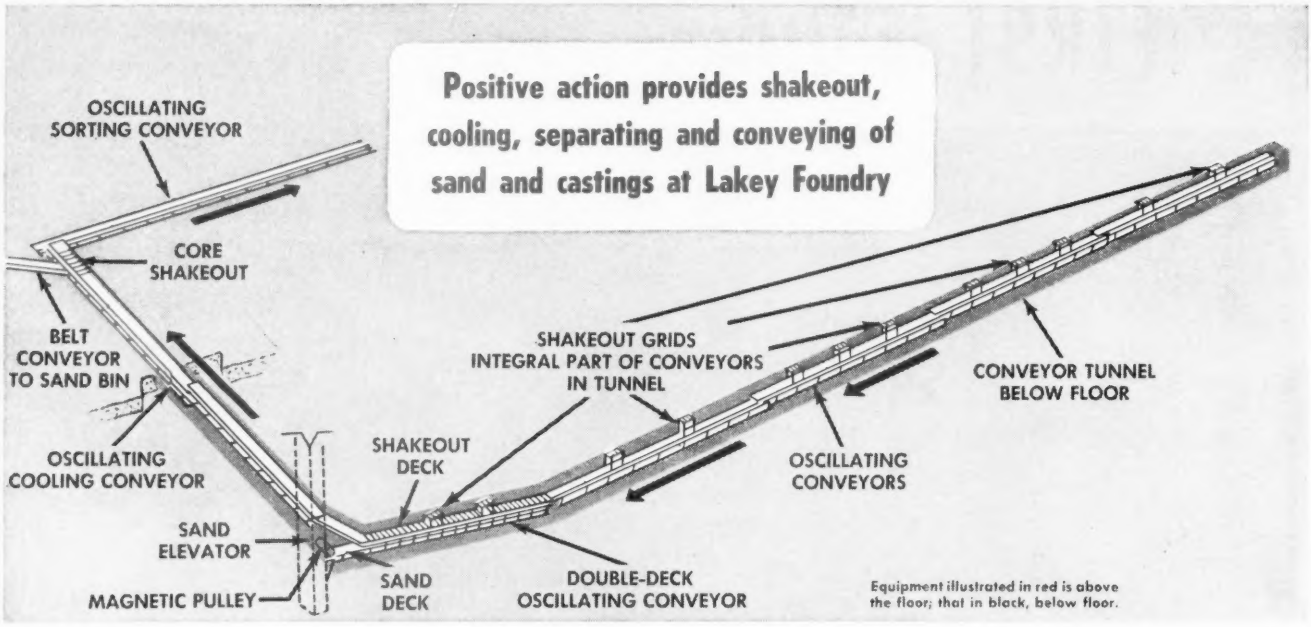
Name .....
Title .....
Company .....
Street .....
City .....
State .....

Fo

SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY INTERNATIONAL HARVESTER COMPANY

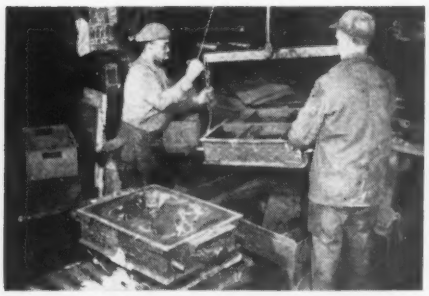
Gets MULTIPLE-DUTY with LINK-BELT Oscillating Conveyors


Positive action provides shakeout, cooling, separating and conveying of sand and castings at Lakey Foundry
OSCILLATING SORTING CONVEYOR
CORE SHAKEOUT
BELT CONVEYOR TO SAND BIN
OSCILLATING COOLING CONVEYOR
SHAKEOUT DECK
SHAKEOUT GRIDS INTEGRAL PART OF CONVEYORS IN TUNNEL
CONVEYOR TUNNEL BELOW FLOOR
OSCILLATING CONVEYORS
SAND ELEVATOR
MAGNETIC PULLEY
SAND DECK
DOUBLE-DECK OSCILLATING CONVEYOR
Equipment illustrated in red is above the floor; that in black, below floor.

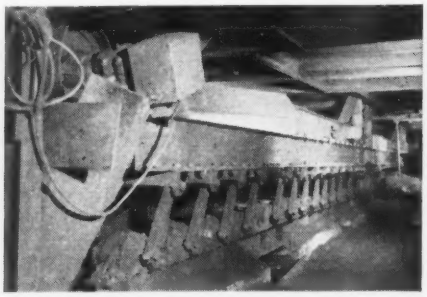
HERE'S proof that the positive action of Link-Belt Oscillating Conveyors is not affected by surges. The installation at Lakey Foundry, Muskegon, Mich., has 430 ft. of oscillating conveyors performing multiple duties in handling 185 tph of sand and castings.

Five 48-in. wide oscillating conveyors in this system are located under the floor. All have shakeout grids integral with the trough and extending above the floor. Grid units function as tight-flask shakeouts, and sand and castings drop to conveyor trough. The fifth conveyor is double-decked. Sand conveyed on the lower deck passes under a magnetic pulley to remove metal, then is discharged into a bucket elevator. Castings on the upper deck are discharged to inclined oscillating conveyors for cooling and delivery to core shakeout. A flat-top oscillating conveyor above the floor is used for picking and sorting.

Link-Belt equipment and engineering experience — which have produced installations handling up to 450 tph — can bring similar high productivity to your own foundry. For facts on Link-Belt Oscillating Conveyors, call your nearby Link-Belt office or write for Book 2444. These conveyors in standard 36-in. wide sections are available from local stocks.



At shakeout stations, oscillating motion of conveyors breaks sand from flask when flask is set on grids extending up through floor. Sand and castings fall into oscillators.



Link-Belt double-deck oscillator is fed by four other conveyors in tunnel. Top deck carries castings; lower conveys sand under magnetic pulley to bucket elevator.

Worker sorts castings from 54-in. flat-top sorting oscillating conveyor, after the Link-Belt shakeout has knocked out the cores. Capacity is 35 tph.

LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,681

FOUNDRY EQUIPMENT MEMBER FEMA MANUFACTURERS ASSOCIATION INC.

Keeping Gray Iron "out front" is your job...and ours

Selling Gray Iron as a truly *modern metal* in the face of tough competition is *your* job as a foundry operator . . . and *our* job as an association. That it's a winning battle is demonstrated by the consistently high production rate now enjoyed by the Gray Iron industry.

An important element in this success is *good communications* . . . both within the industry itself, and with potential customers. Providing such communications is a prime job of the Gray Iron Founders' Society, a strong national organization of top Gray Iron producers, large and small, captive and commercial.

Every Gray Iron foundry, of course, benefits to some extent from Society activities. But to obtain the *full benefits* of its many programs, you need the regular and stimulating communications that go with active Society membership. For example:

Look what Society membership gives you . . .

Studies on improved foundry management are made immediately available to members. Facts revealed in special studies, Society publications and in local management and cost meetings can be quickly related to your own foundry operations. For example, suggestions for more accurate accounting and price estimating procedures alone can add to your profits.

New techniques, business and technical information from authoritative sources associated with the Society cover reports on research, production, raw materials, equipment and on other special problems. This important information is quickly released to members. Production data alone may lead to increased profit potential for you by reducing internal costs. In addition, a permanent and professional Society staff is ready always to assist members and their customers with individual problems by answering questions of a technical or business nature.

Sales prospects for members . . . The Society concentrates its national advertising in the trade and technical publications read regularly by castings buyers. This advertising stresses Gray Iron's engineering properties and design possibilities. The Society emblem is prominently featured as a symbol of good service and efficient foundry practice. Consistent advertising is helping to make this emblem more important to buyers. And because of this, the Society has gained broad recognition and acceptance as a source of Gray Iron information to castings buyers.

Statistical data, terms and conditions of sale, data on how to combat competitive metals, two-way communications with government officials . . . these important Society services are of practical dollars-and-cents value to you.

* * *

This broad-gauge job of providing both internal and external communications for the Gray Iron industry is vital to *your* business. To take a stronger and more active part in this task . . . to better equip yourself for your own personal selling job . . . let the Society work for you and with you. The cost of Society membership and assistance is very low. Mail the coupon for complete information on Society services.

GRAY IRON FOUNDERS' SOCIETY, INC.
National City-East 6th Building, Cleveland 14, Ohio

Please send me full information describing Society services and how they will benefit me.

Company _____

Name _____ Title _____

Address _____ City _____ State _____

GRAY IRON FOUNDERS' SOCIETY

Note how the Auto-Scoop crowds into pile at ground level and can tilt bucket back *before hoisting*. Fast retracting action can actually flip load into bucket, enables operator to obtain full bucket even from small stockpiles.

Lower bucket tilt-back, **lower** carry bring you **higher** daily production

Insure full bucket without traction crowding, improve stability, speed travel.

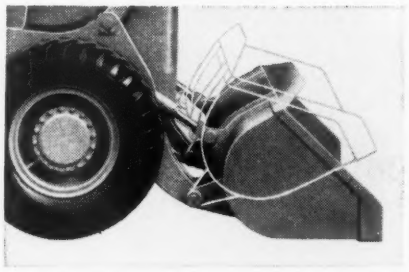
Every feature of the Jaeger 12 cu. ft. Auto-Scoop is specially engineered to cut your cost of bulk handling. A unique advantage is ability to move into material and then retract the bucket independently of hoisting, repeatedly if necessary, at ground level.

Thus, the operator can load stubborn materials *without the traction crowding that causes excessive clutch slippage or tire wear.* He simply works material into the bucket with the tilt-back action as he moves forward. As the bucket fills, traction is increased by the downward thrust on the front driving wheels, right from the start.

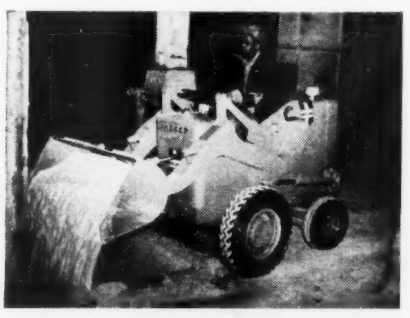
In addition, low-level tilt-back enables the operator to load from small stockpiles or windrows where materials tend to move away — to actually flip the load into the bucket. It also permits carrying full bucket as low as 4½" above the ground, provides lower center of gravity which improves stability in travel, results in faster operation. And in such applications as carrying from stockpile to mill, it avoids the need for repeated hoisting and lowering.

Other features that help you cut handling costs include greater lifting capacity (1200 lbs.), more power (33 hp @ 1800 rpm), faster speeds (to 13.88 mph in reverse, 7.66 forward), shorter turning radius (6'6"), higher clearance (4'6" under lip, 6'8" under hinge) and longer reach (2'7"). Write for Catalog L12-4 and name of the nearest Jaeger Auto-Scoop distributor.

(*Comparisons based on other well-known scoop loaders now in the field.)



How hydraulic pistons retract the bucket independently of hoisting action. By combining tilt-back and hoisting, the most stubborn materials are readily loaded, does away with traction crowding that causes slippage.



Low tilt-back, low carry make it possible to load, travel and unload without repeated hoisting and lowering. Cuts time on many jobs.

For bigger work, Jaeger offers the 1 cu. yd. Load-Plus, with torque converter, power steering and either front-wheel or 4-wheel drive.

The Jaeger Machine Company, 502 Dublin Avenue, Columbus 16, Ohio

JAEGER LOAD-PLUS *auto-scoop*

AIR COMPRESSORS • PUMPS • MIXERS • PAVING MACHINES

Distributors throughout U.S. and Canada and Principal Cities of the World

AQUA-SET

CORE BINDERS

Herald the dawn of a new day for core room practice

TWO new tools make the miracle of a fast bake possible—they are dielectric heat and *Aqua-set Core Binders*. Fast heat and fast setting binders do the job together. Now, in minutes, cores can be baked from center to surface and that's just the first saving. A core room which has been modernized with Dielectric Ovens and *Aqua-set* continues to save on costs because:

(1) It requires less floor space to operate
(2) No oven warm-up is needed
(3) Increases core thru-put
(4) Cores cannot be overbaked
(5) Reduces radiant heat in the core room
(6) Adds to comfort and health of personnel
(7) Gears core room schedules more closely to Foundry needs
(8) Saves room required for stored cores
(9) Saves room required for core handling equipment
(10) Lowers the cost of heat for baking
(11) Eliminates cooling cycle for cores before they can be handled and
(12) Cost of the sand mix itself is often lower than when oil is used for conventional baking.

These facts are just teasers. One foundry discovered that a single man could do all the work that formerly required four. Another found that their oven could be operated under full load at only 45 cents per hour.

For data on Resin Binders designed especially for use with dielectric heat write us and we will be glad to supply you with our latest *Aqua-set* Bulletin.

Remember—The first core ever baked with dielectric heat was bonded with **AQUA-SET.**

UNITED OIL MFG. COMPANY

1429 WALNUT STREET • ERIE, PA.

at no extra cost to you . . .

NEW Quality Features on All AIR and HYDRAULIC CYLINDERS

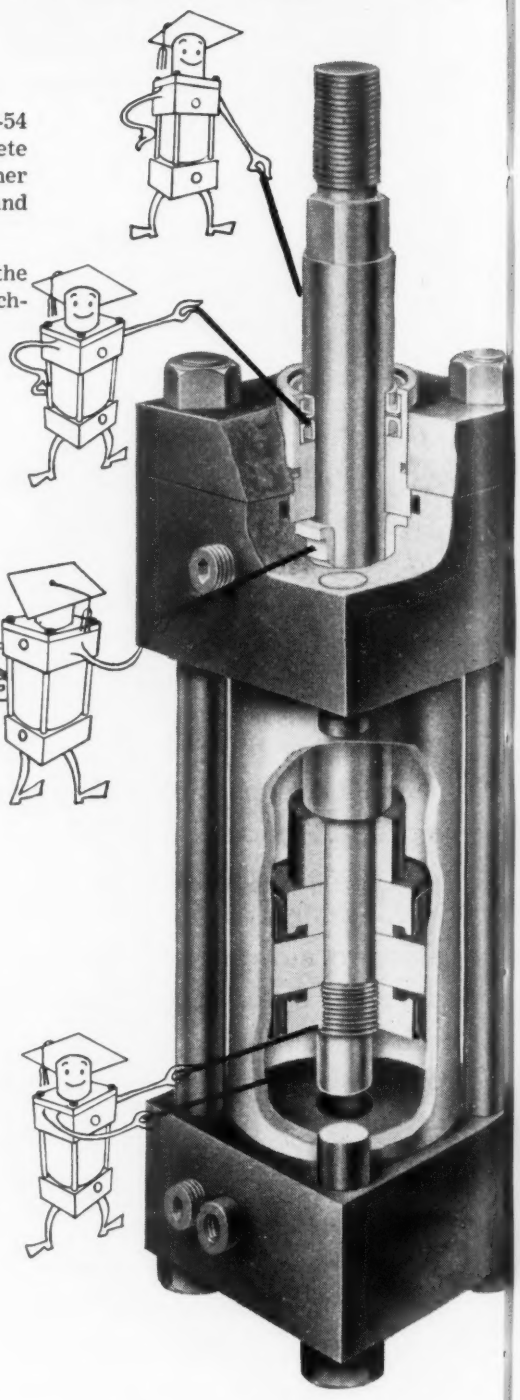
CASE HARDENED CHROME PLATED PISTON RODS

On all Miller Air and Hydraulic Cylinders

Benefits To You

CASE-HARDENED Piston Rods (52-54 Rockwell "C") provide practically complete protection against damage from hammer blows, wrench-dropping, mishandling, and similar occurrences.

The HARD CHROME PLATING over the case-hardened rods protects against scratch-damage and rust.



"TEFLON" WIPERS

On all Miller Air and Hydraulic Cylinders

Benefits To You

"TEFLON" Rod Wipers and "TEFLON" Hydraulic Seals withstand temperatures from —100° F. up to 500° F. They are impervious to practically all known chemicals, including the fire-resistant, special, and standard hydraulic fluids in current use.

"TEFLON" HYDRAULIC ROD SEALS

On all Miller Hydraulic Cylinders only

RUST RESISTANT SURFACES

On all Miller Air and Hydraulic Cylinders

Benefits To You

Highest quality Black Ferric Oxide Finish provides rust protection in air cylinder operation and on all cylinders during shipping and installation.

Cylinder heads, caps, mountings, pistons, followers, and the unplated portions of the piston rods have this finish. It is not recommended for water service.

WRITE FOR CYLINDER BULLETINS H-104 and A-105

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

Over 8,000 Different Cylinder Selections Available for Immediate Delivery. Write for Complete List.

EFFECTIVE DATES

These new Miller features will be provided at no extra cost after January 1, 1956—and at Miller's option prior to that date.

SALES AND SERVICE FROM COAST TO COAST

CLEVELAND • YOUNGSTOWN • DAYTON • TOLEDO • CINCINNATI • COLUMBUS
PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY
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DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • ATLANTA
TORONTO, CANADA and OTHER AREAS

MILLER FLUID POWER CO.

2034 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMU
COUNTERBALANCE CYLINDERS

(Advertisement)

Four More Miller Firsts . . .

Our "Report To Cylinder Users" was a simple statement of Miller Fluid Power Company's policy. In it was mentioned our dedication to the constant improvement of our products.

In line with this policy, here are new quality cylinder features that will eliminate many of the problems which you have reported to us.

Miller gave cylinder users one of its firsts when we chrome-plated all cylinder piston rods. Our reason was obvious. Chrome-plating gave every rod a mirror-like finish that no corrosive or abrasive dust could scratch. Miller made this chrome-plated, longer lasting rod standard. AT NO EXTRA COST.

Preventing Damage To Piston Rods

There were still plenty of hazards to which piston rods were subjected. A careless workman with a too handy wrench or pair of pliers meant a scored piston rod. A falling object striking the rod dented the softer metal beneath the plating of chrome. A jolt during assembly left its trouble-breeding mark. All of these nicked and scored the piston rods, damaging the whole assembly. Little could be done about this beyond repair and replacement—until the Miller announcement that from now on the piston rods on all cylinders—air and hydraulic—will be specially hardened (52-55 Rockwell C) to foil the carelessly used tool, the accident in transit or assembly, the falling object or unnoticed knock. Naturally, the new hardened rods will still be chrome-plated. Miller will now make this super quality an everyday standard. AT NO EXTRA COST.

Meeting The Challenge Of The New Demands On Seals

Rod seals on Miller hydraulic cylinders were constructed to be leakproof under all ordinary operating conditions. We guaranteed this. But we also stated in all our catalogues that for special conditions there must be special rod seals at an extra cost. Rod seals to withstand high temperatures had to be specially constructed. Where fire resistant fluids were used, special rod seals had to be provided at an extra cost. Because many fire resistant fluids destroy ordinary packing.

The present widespread use of these fluids and excessive heat generation from high speed operation and increased loads have resulted in reports of trouble on cylinders where ordinary seals were subjected to these hazards. These reports were not received with joy at Miller, even when the fault was definitely not ours. We don't like to have trouble develop on any Miller installation under any condition. So we decided to do something about these problems of the rod seals.

A new expensive material known as "TEFLON" has been developed for use as seals. This material is impervious to temperatures from —100° to plus 500° F. It resists all known fluids, even the most destructive of the fire resistant fluids. Now, every piston rod on every Miller hydraulic cylinder will be fitted with "TEFLON" Piston Rod Seals. AT NO EXTRA COST.

In addition, all rod wiper seals on all Miller Air and Hydraulic cylinders will be of the same chemical-and-heat resisting Teflon material.

These Teflon rod wiper seals will be standard on every Miller cylinder, regardless of how and where it will be used. This is Miller's way of doubly insuring cylinder users against all possible hazards. AT NO EXTRA COST.

Protection Against Rust

The barrels of Miller air cylinders are of moisture-resistant brass. The barrels of hydraulic cylinders, since they run in oil, are protected once they are installed and in operation. Beyond this all cylinder parts are subject to rust and corrosion. Such exposed parts as heads, caps and tie rods quickly show the unsightly evidences of rust. At least this has been so up till now. But all this is now being corrected.

From now on Miller will protect all these parts on both air and hydraulic cylinders with a black oxide process in which a chemically created ferric oxide coating is developed on the surface of the metal to protect against rust and other corrosion. Every Miller cylinder sold will carry this added protection. AT NO EXTRA COST.

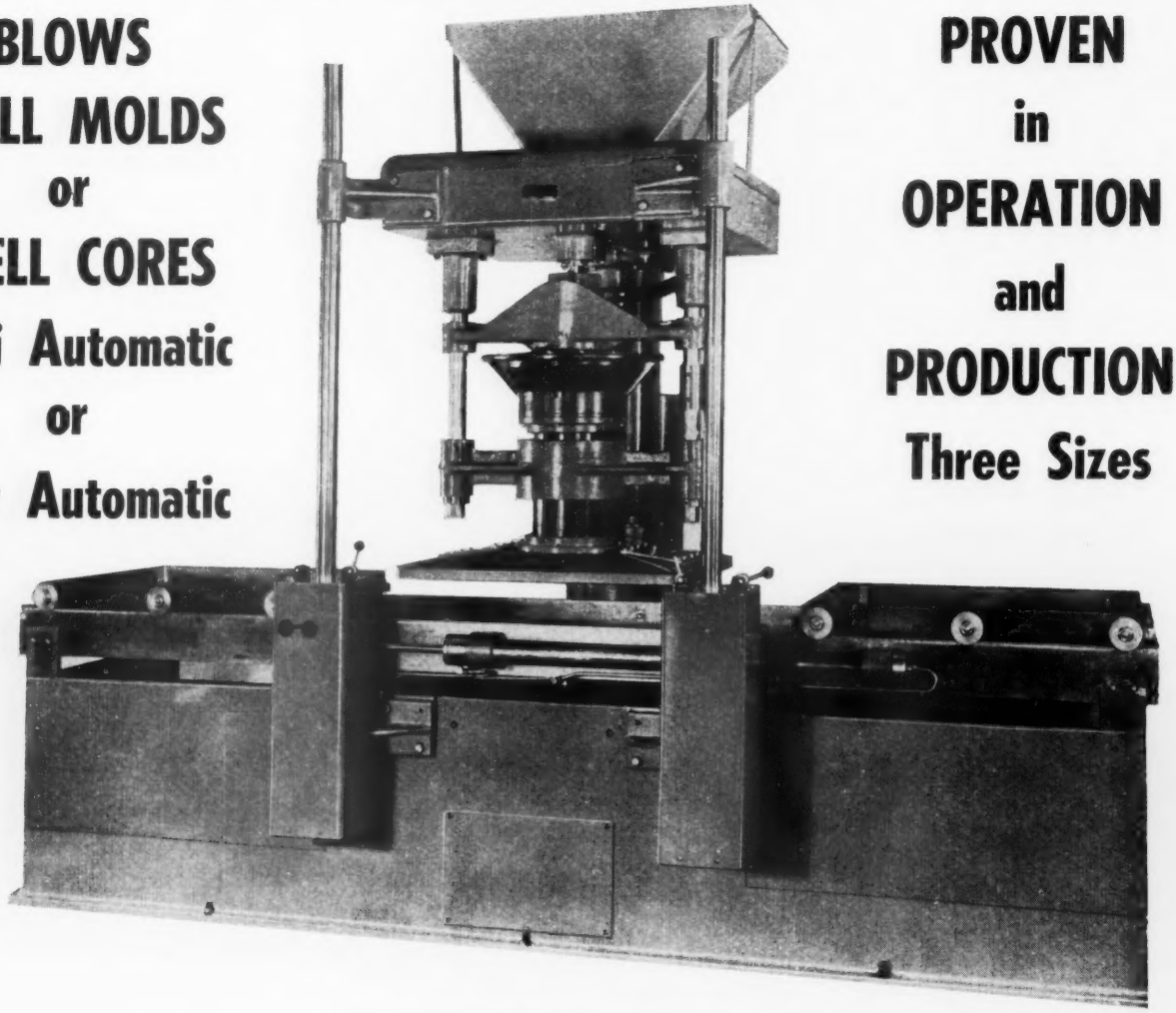
These four new Miller firsts are added to the many firsts established by Miller. Like other Miller firsts which created new departures in cylinder design and construction, these are now offered as Miller standard specifications. AT NO EXTRA COST.

MILLER FLUID POWER COMPANY
2034 N. Hawthorne Avenue
Melrose Park Illinois

HARRISON ▪cOR-BLo▸ Machine Co.

SHELL 24x36 BLOWER

BLOWS SHELL MOLDS or SHELL CORES Semi Automatic or Fully Automatic



PROVEN in OPERATION and PRODUCTION Three Sizes

EXCLUSIVE FEATURES

1—AUTOMATIC SAND FEEDER.
Sand is automatically fed from Sand Bin to Hopper and transferred to Sand Tube between every blow.

2—ENCLOSED HEATED MOLDS.
Completely cures inside and outside of shells to a perfect contour surface and uniform thickness.

3—AUTOMATIC BLOWING AND VENTING.
Blown and vented into, and through, the Hot Molds allows placing the blow and vent tubes at the proper place for dense shells.

4—SHELL MOLDS.
Blown into sealed and closed heated molds at 100 PSI while being perfectly sealed, gives perfect uniformity and density.

5—DOUBLE MOLD MACHINE.
Gives continuous curing until Shell is ejected, and more than doubles the production of a single machine.

6—DOUBLE EJECTION STATION.
Operator removes finished shell while machine is automatically blowing and opening other mold.

HARRISON MACHINE CO.

Box 67, Wesleyville, Erie, Pa.

dag
DISPERSIONS®

OBERDORFER FOUNDRIES, INC. uses 'dag' dispersions in more than 15 operations

To speed the production of non-ferrous castings for jet engine frames and other complex parts, Oberdorfer Foundries, Inc., Syracuse, New York, uses **'dag'** Colloidal Graphite in many ways. For example:

. . . As a coating for cast iron and steel chills, the refractory *dry lubricating film* prevents aluminum from fusing to the chills.

. . . As an ingot-mold wash, a **'dag'** dispersion notably increases mold life and greatly improves surface qualities of the castings.

. . . As a chilling agent, **'dag'** Colloidal Graphite hastens solidification of heavy sections in permanent-mold castings.

Oberdorfer relies on **'dag'** Colloidal Graphite because it is highly refractory and will tolerate any temperature met in the foundry. Coatings of **'dag'** dispersions do not adsorb harmful gases, are chemically inert, promote rapid heat transfer and chilling, and help to maintain the high quality production for which Oberdorfer is famous.

To learn how this versatile material can help *you* produce finer castings, write for our free booklets on general applications of **'dag'** dispersions in the foundry and **'dag'** Colloidal Graphite used as a parting compound. Write for Bulletins No. 425-Q11 and No. 427-Q11.

Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a wide variety of carriers.

ACHESON COLLOIDS COMPANY

PORT HURON, MICHIGAN

. . . also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

use 'dag' dry films for trouble-free lubrication

UNITS OF ACHESON INDUSTRIES

Now . . . 7 big improvements for foundrymen
from HANNA . . . the best known name in iron . . .

HANNATEN

THE IRON INGOT WITH THE NEW SHAPE

For users of 10-lb. pigs

AVAILABLE IN ALL GRADES AND EXTRA-CLOSE-GRAIN HANNATITE. (STANDARD 38-POUND PIGS ALSO AVAILABLE.)

THE HANNA FURNACE CORPORATION

Buffalo • Detroit • New York • Philadelphia

Merchant Pig Iron Division of

NATIONAL STEEL CORPORATION

DINGS Magnetic Equipment helps BEARDSLEY & PIPER turn in better performance records on sand preparation

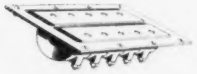
DINGS *line includes:*

Electric and non-electric magnetic pulleys

Non-electric magnetic drums

Type RM rectangular suspended magnet

Lifting magnets



Non-electric PERMA-PLATE magnets

BEARDSLEY and PIPER know that *complete* sand preparation includes *complete* magnetic separation . . . and to make sure of top-notch performance, this progressive company uses DINGS electric and non-electric magnetic pulleys and drums in its modern line of sand preparation units such as their "NITE-GANG" shown above.

DINGS offers the foundry industry the newest, most complete line of magnets and magnetic separators made . . . from low cost Alnico Perma-Plates to rugged lifting magnets and the most powerful self-cleaning rectangular magnet ever built . . . for pulling large and long pieces of tramp iron from deep burdened, fast moving belts.

Let your nearest DINGS representative tell you about the latest developments in magnetic equipment for foundries . . . or mail the coupon for further details.

Dings

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wis.

MAIL THIS COUPON TODAY

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wis.

PLEASE SEND ME CATALOG C-5000-B.

NAME_____

TITLE_____

FIRM_____

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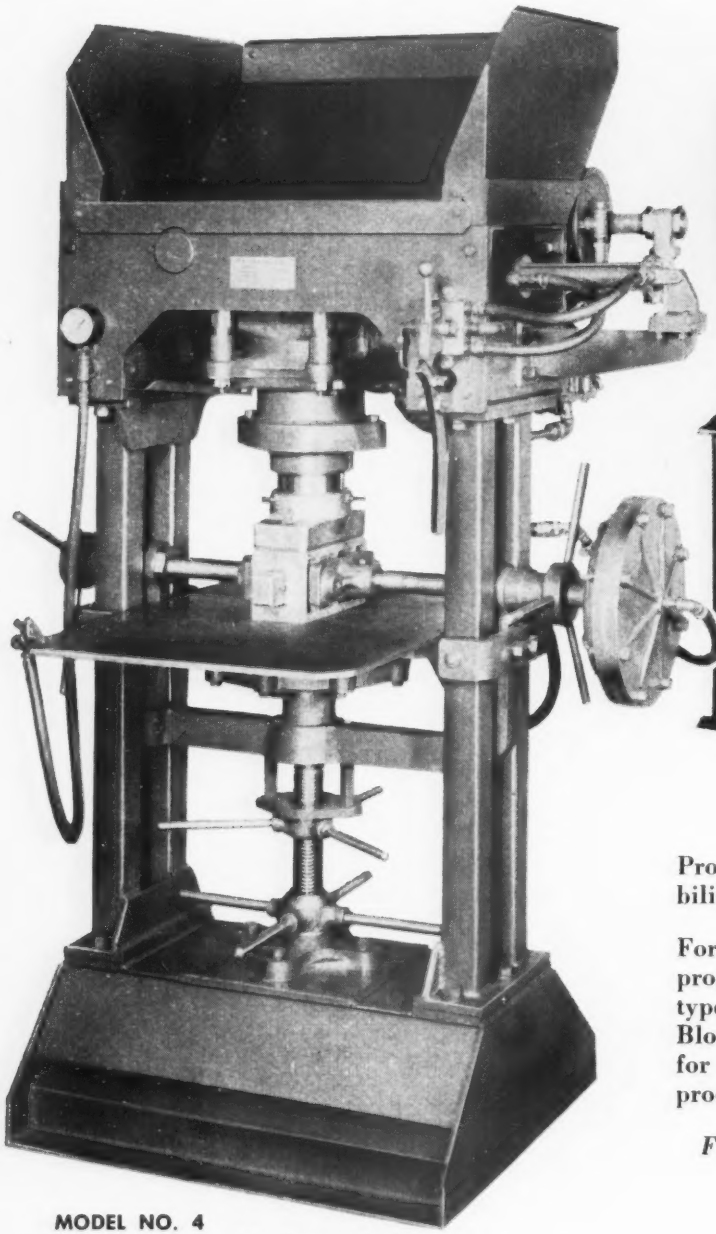
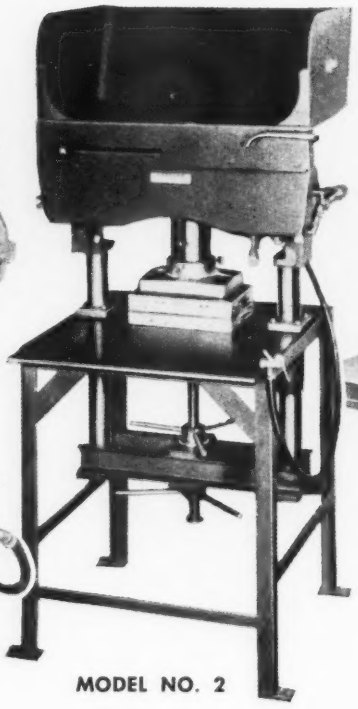
CITY_____ ZONE___ STATE_____

PD155

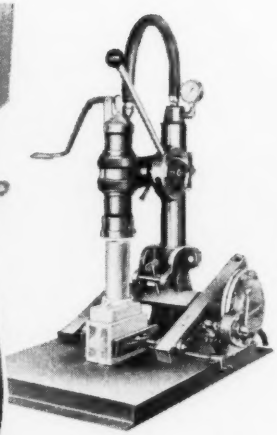
Redford CORE BLOWERS



MODEL NO. 4
(Also available with draw cylinder)



MODEL NO. 2



BENCH TYPE

Proven performance — simplicity — flexibility — power — speed.

For 10 years now Redford has kept pace with progress in the foundry. From the first bench type to the new No. 4 . . . all Redford Core Blowers are designed to meet your demand for better cores at lower cost, regardless of production requirements.

For complete information, write for our detailed literature.

Redford IRON & EQUIPMENT CO.

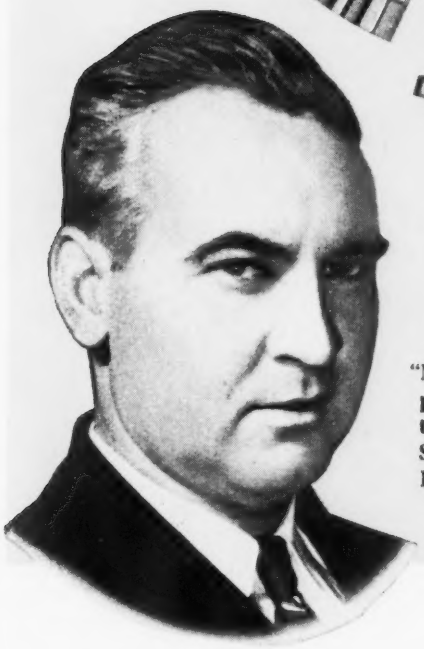
20733 GLENDALE AVENUE • DETROIT 23, MICHIGAN • PHONE: KENWOOD 1-8611

TAYLOR & CO., INC., REPORTS

"90% less machining

through shell molding

with G-E SHELL RESINS"



"Now we can offer customers precision-cast parts which often eliminate machining up to 90%," reports James J. Silk, Shell-mold Superintendent, Taylor & Co., Inc., Brooklyn 22, N. Y.

"Shell molding with General Electric resins enables us to turn out intricate castings with a smoothness of finish and sharpness of contour difficult to achieve by conventional sand molding—parts that may often be used 'as-cast.' G-E resins are used exclusively in our shell-molding foundry because their consistently uniform properties help us realize the many advantages of this new casting process."

Taylor uses three General Electric shell-molding products to turn out such cost-cutting parts as shown here: *G-E 12374 phenolic shell-molding resin* to form strong, dimensionally accurate molds, *G-E SM-55 silicone parting agent* to secure quick, easy release of molds from patterns, and *G-E 12316 bonding resin* to cement shell halves together.

Progress Is Our Most Important Product

GENERAL ELECTRIC

ASK G. E. ABOUT SHELL MOLDING

How can shell molding help YOU? General Electric maintains a shell-molding laboratory in Pittsfield, Mass., to help foundrymen and casting buyers solve problems and evaluate the process. G.E. also offers an informative 28-page manual describing the techniques and benefits of this new foundry method. *Send for it today!*

FREE BOOKLET AVAILABLE!

General Electric Company
Section 522-5A, Chemical & Metallurgical Div.
Pittsfield, Massachusetts

Please send me a free copy of *G-E Shell Molding Manual.*

☐ We are presently using the shell-molding process.

☐ We are interested in the shell-molding process.

Name_____

Firm_____

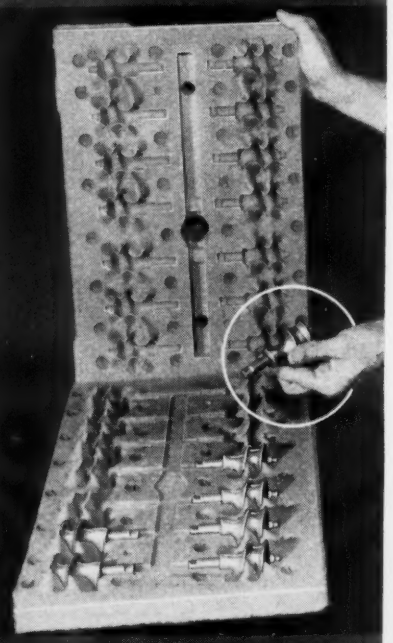
Street_____

City_____ Zone___ State_____

FOR FASTER CURES...SMOOTHER SURFACES...BETTER CASTINGS

CATALIN SHELL MOLDING RESIN 9616

View of automatic shell mold machine, indicating shell ejection operation, shown to left... And a typical shell mold specimen, shown below... were photographed at the foundry of C. A. Goldsmith Company, Newark, N. J.



Higher production rates, new advanced techniques and automatic equipment, smoother and more accurate castings are the direct industrial contribution of the shell molding process . . . yet without fast-setting phenolic resins to bond the sand, the entire process could never have been possible! Since first introduced, too, shell molding resin formulations have also undergone self-transition periods of change and betterment.

Today Catalin Resin 9616, a two-stage, powdered phenol-formaldehyde resin, emerges as the very latest and best type of formulation.

This economical resin produces high-speed curing rates with the minimum of resin content. Savings are achieved in time, sand, work space, handling and metal. Castings are more accurate and smoother — require considerably less finishing.

In addition to Shell Molding Resin 9616, Catalin produces a wide range of core binding liquid resins and powders for the production of ferrous and non-ferrous metal castings.

Catalin representatives, familiar with the requirements of the foundry industry, are available for consultation. Samples on request! Write . . .

CATALIN CORPORATION OF AMERICA
ONE PARK AVENUE, NEW YORK 16, N. Y.

Catalin

BRANCH OFFICES: CHICAGO, ILL., 221 No. La Salle Street
GREENSBORO, N.C., 630 Southeastern Bldg.

PLANTS at FORDS, N. J.
CALUMET CITY, ILL.
THOMASVILLE, N.C.

"One unit pays for the next"

KEEN FOUNDRY COMPANY reorders

Handy Sandys 6 TIMES

Mr. Lou Keen, President of Keen Foundry Co., Griffith, Indiana, states: "We've invested in ten Newaygo Handy Sandys in less than 3 years for several reasons. First, these individual Sand Handling Units are very adaptable to the physical characteristics of our foundry. Second, their great flexability gives us overhead sand stations at any point in the foundry without costly remodeling. Third, Handy Sandys require low capital investment."

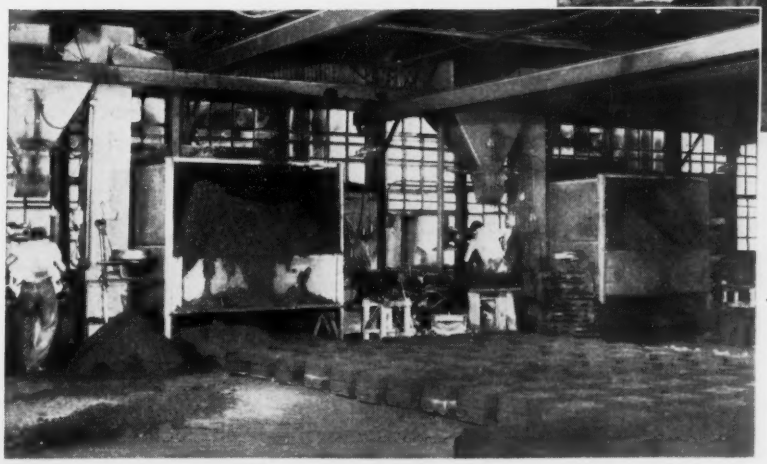
"Naturally, the proof of the equipment's value to us is its performance. Since installation we have, in one section of our foundry, conservatively increased mold output by over 25%. In another section, in conjunction with a change in molding procedures, we are still maintaining the same mold production over a six hour period, but we are getting twice as many castings per mold."

"We also figure the molder's fatigue factor has been decreased by 50%. Before Handy Sandys the average molder shoveled about 15 tons of sand per day; now he uses the shovel for occasional cleaning up around the molding machine."

Keen Foundry Co., a grey iron production operation, manufactures castings for electric hoists, gas pumps, engines, pressure valves, air compressors, machine tools and other industries. Castings weigh from 5 lbs. up to 100 lbs. each, and the flasks used with the Handy Sandys vary from 18" x 18" to 24" x 30".

Three of these Newaygo units operate in conjunction with Osborne Rotolifts averaging about 120 molds per unit in a 6 hour period. On this job each mold has 8 castings and 4 cores. Molds are set out by molder using overhead crane hoist.

The lower sand bins and boot of elevators are sunk 3 feet into the floor almost tripling the sand capacity of each Handy Sandy Unit.

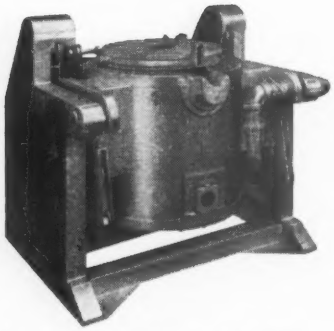


Showing two Handy Sandys over squeezer work. These units produce over 140 molds each in a six hour period. Molds are set out by operators who also handle pour off.

Sand bins on all ten units are supplied from a central sand system by a Payloader.

A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone

NEWAYGO engineering company
NEWAYGO, MICHIGAN
Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment



Lindberg-Fisher type MNP nose-pour tilting crucible furnace. Pouring lip is located in the axis of tilting providing a constant pouring arc regardless of degree of furnace tilt. Capacities up to #800 crucible with brass, up to #1000 crucible with aluminum. Oil or gas fired. Described in Bulletin 57-A.

Lindberg-Fisher Electric Resistance Melting and Holding Furnace equipped with heavy duty resistance elements which give uniform distribution of heat, insuring long element and pot life. Capacities 250 to #1000 crucible.

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A complete line of

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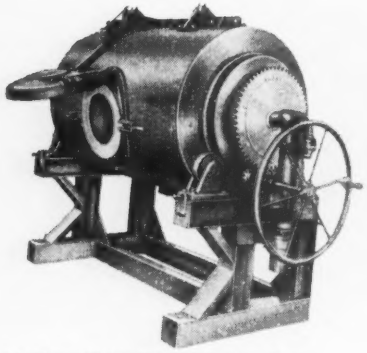
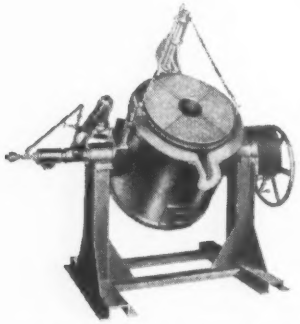


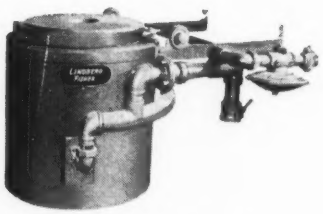
Lindberg-Fisher Simplex Rotary Open-Flame Furnace. Capacities to 2400 lbs. aluminum. 6000 lbs. brass. Oil or gas fired. Described in Bulletin 29-A.

For Melting Aluminum • brass • yellow brass bronze • copper • copper nickel alloys • lead magnesium • nickel • tin • zinc.

Because Lindberg-Fisher builds *all* kinds of melting equipment ... gas ... oil ... electric ... induction, and Carbon arc ... L-F engineers are able to recommend, without prejudice, the proper type of furnace for *your* particular melting requirements.



Lindberg-Fisher type BB1 Hand-Tilt Crucible Furnace. Tilting mechanism consists of a hand wheel, driven through machined worm gear and pinion reducing gears. Capacities 50 to #400 crucible. Oil or gas fired. Described in Bulletin 400.



Lindberg-Fisher type SF stationary crucible furnace features rapid melting and is recommended for general foundry casting work. Capacities 30 to #400 crucible. Oil or gas fired. Described in Bulletin 301.

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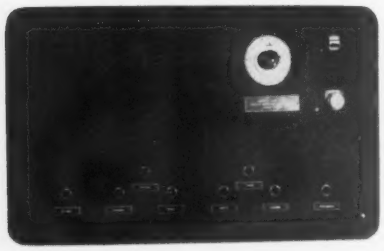
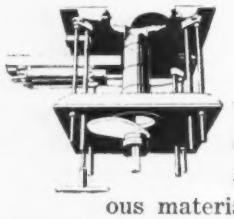


HARTLEY TIME GUIDE
Will automatically control all phases of the mixing cycle



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assures the molder a constant sand supply

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Corporation
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The original manufacturer of automatic controls for sand systems.

Readers' Comment

Cartoon Is Enjoyed

TO THE EDITORS:

We get the biggest kick out of your page 170, August, 1955 FOUNDRY magazine.

Can we obtain 50 or 100 copies of page 170 to circulate among our customers and friends at our expense, or might we obtain your permission to duplicate the page or portion thereof,

"We don't make much from castings—our soft drink machine makes the real profit."

indicating the copies as reprints from your August issue?

Thanking you for your consideration and help in this matter, and congratulations for your "Humor"—it's great.

GRANT ROTH
President

Ace Foundry Co.
353-363 N. Lamon Ave.
Chicago 44

* * *

Shell Molding Comments

TO THE EDITORS:

Your article entitled, "So You Are Going To Try Shell Molding?" in the August issue of FOUNDRY must by now have excited a great deal of comment, and our three companies join together here to comment further. Our reaction is mixed. We commend you highly for a creditable job of reporting, and the same time we take strong exception to editorial comment within the article which we consider to be ill conceived.

Since your article is generally accurate, well organized, and well written, we consider it to be generally very good. To be helpful and constructive, and to register with you our disagreements, we look to details for comment, and it is only to certain details—important ones—that we feel it necessary for us to take exception.

You advise companies (whose policy is to construct their own equipment) to construct their own shell molding equipment. We feel this is bad advice, because we know of a number of expensive fiascos which have occurred as a result of "do-it-yourself" attempts in this direction. Shell molding techniques are new to foundries and thus replete with problems. The toughest is the design of equipment, and it seems unwise for a foundry to tackle for itself the toughest of the problems involved, when this problem has already been solved by others.

We know of no case where a foundry has produced its own machine and found it fully satisfactory for less than a wastefully extravagant cost, certainly not less than the cost of equipment they could have purchased from reputable established shell molding machine manufacturers.

You offer as the best alternative to building their own machine the purchase of an automatic or semiautomatic commercial machine. As producers of 36 different sizes and models of automatic and semiautomatic commercial machines, we are inclined to encourage such purchases by foundries; but being aware as we are of the extraordinary success of scores of foundries who are using our manually operated equipment, we point out that there are applications where manual equipment must be more suitable than automatic or semiautomatic units.

One simple factor favors the manual over the automatic, whether it be our design or others—capital cost. And incidentally, manual equipment, which in a sense substitutes lever pushing for button pressing, is just as fast as automatic equipment (since oven curing time governs both), leaving labor saving as the only major advantage of automatic equipment.

You are correct in advising foundries to obtain a machine suitable to the general class of work which they intend to run, and this is where the machine manufacturer can be helpful. The machine manufacturer should be asked to review the work in advance, and should be asked for his honest recommendation. He should be expected to stand behind his recommendation, to guarantee unconditionally any equipment he suggests for a particular application, and to assure the availability of service personnel and of himself to see personally to the effective and optimum use of the

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HANDLING EQUIPMENT

5582

equipment purchased.

Our engineers do not agree with you that gas or electric heat works equally well. We offer most of our equipment with the option of gas or electric heat. We strongly recommend, and most customers with shell molding experience prefer, electric heat for all purposes—for pattern heat, for oven heat, and for corebox heat because of the excellent control and uniformity provided by electric heat. We also deplore the lost time suffered in reheating a pattern in an oven. The oven is for shell curing; the pattern should obtain its heat elsewhere, preferably from a master heater plate or from its own thermostatically controlled electric heater elements.

You imply that the resin salesman is helpful in demonstrating the production of good shells, and we agree. We feel you could expand this advice to include the machine manufacturer, who is often better qualified and better equipped to provide this service.

Your suggestions about pattern-making and gating are excellent, and we believe they will provide sound guidance to a lot of newcomers to the field. Even the more sophisticated shell molding foundryman or pattern-maker has good reason to read and heed your remarks.

The exceptions we have taken, you will see, are of minor proportions compared to the overwhelming weight of good sound advice you provided.

JOHN B. SHALLENBERGER
President

Shallway Corp.
1000 S. Fourth St.
Connellsville, Pa.

* * *

Wind Is Too High

TO THE EDITORS:

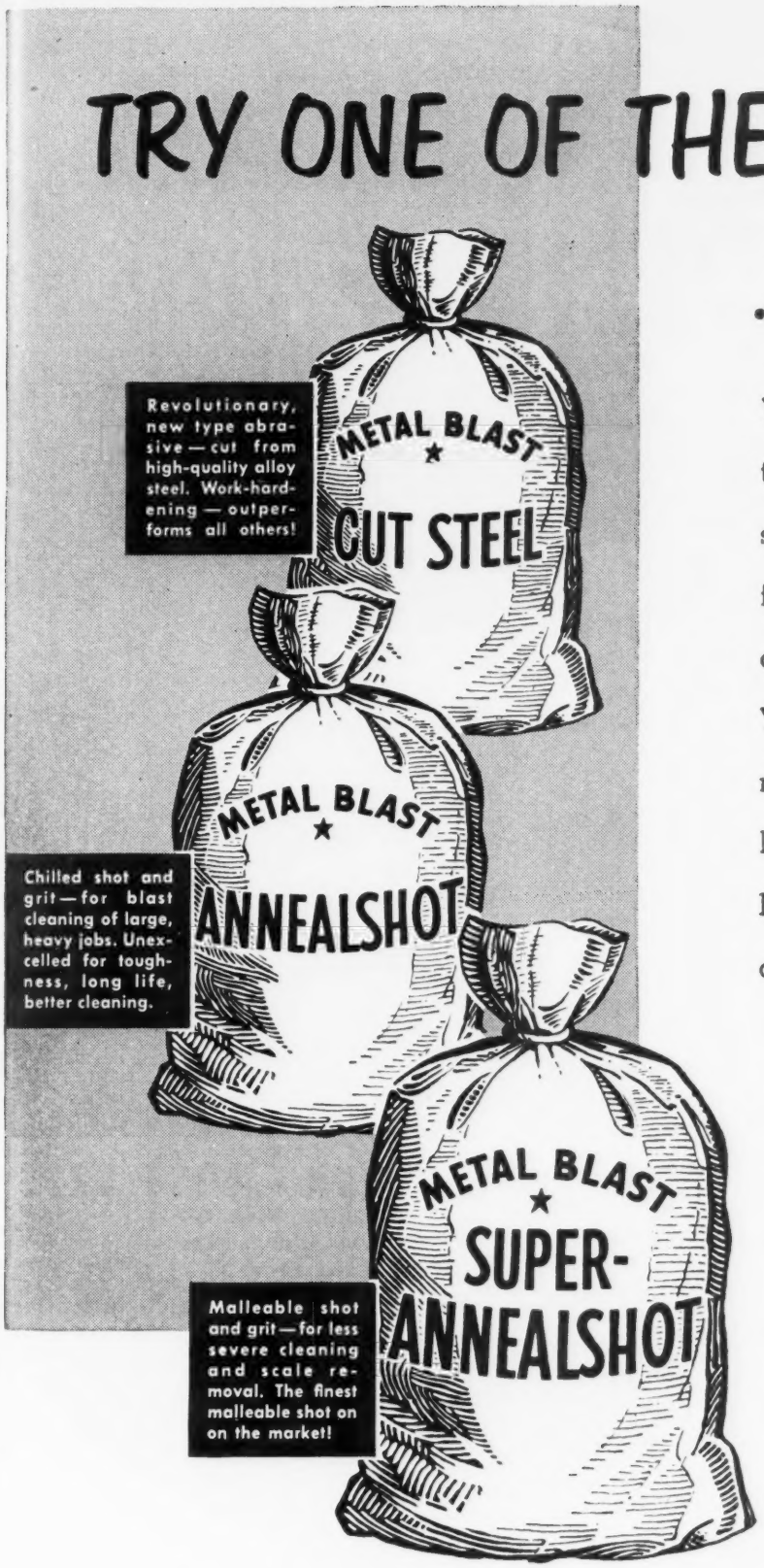
We just have received the first copy of your magazine and were greatly interested in the articles as well as in the advertising. In the article "Designing a Small Cupola" in the June issue, page 128, reference is made to the AFS *Handbook of Cupola Operations,* and we are interested in knowing more about it.

Also we would like to point out that there is an error in the formula for calculation of the amount of air. In item 3 (page 128) it states "Approximate air required through the tuyeres = 30,000 cu ft per ton melted or 150 cu ft per pound of coke per hour. $0.7854\ A^2 \times 7 \times 150 \div 60 =$ cfm air through the tuyeres". This will give 10 times the amount of air required—150 should be 15.

HELIO CAPELLI C.
Superintendent

Fundicion Rodighiero
Santiago, Chile

TRY ONE OF THESE THREE ...and SEE!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Enlarging the Market

Shell molding has been one of the most controversial developments in the foundry industry. Ever since government representatives brought information on the basic features of the process from Germany following the war, discussion has been rife over the value and potentials of that method of producing castings. The debate continues.

From the beginning, shell molding caught the imagination of a great segment of the industry. Probably no other new process for use in the production of castings has been tried experimentally by so many individual foundry organizations. Many firms have gone into the field, as is evidenced by the fact that 422 companies in the United States and Canada reported shell molding production in the recent *Penton's Foundry List* study. Examination of the process continues, with numerous companies reappraising the possibilities in the light of today's trends and demands.

Further evidence of the growth of shell molding is provided by the increase in the use of resins for that purpose. According to an estimate published in our May issue, sale of shell molding resins in the United States increased from 0.25 million tons in 1950 to 8 million tons in 1954, and experts in the field believe that the upswing will continue.

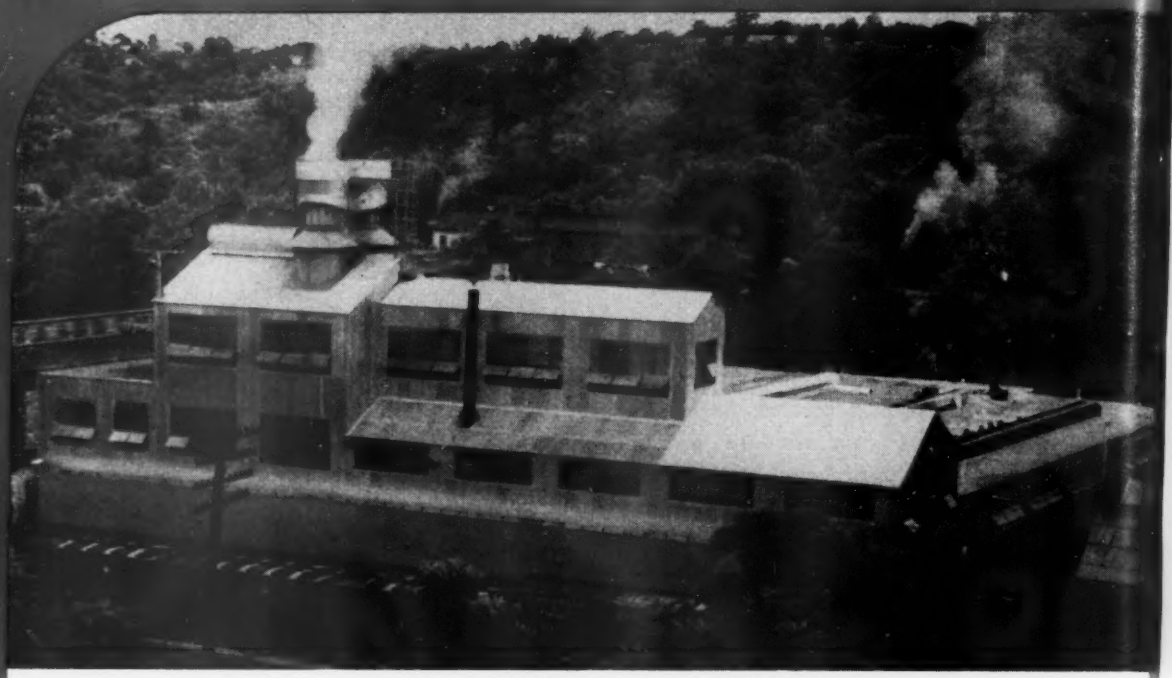
As the process is developed further and new foundries are equipped for exclusive shell molding production, such as that described in this issue, pages 102 to 115, more attention should be paid to the possibilities provided for converting components made by other forms of fabrication to castings. As is indicated by recent trends in shell molding production, the progress that has been made in increasing the physical properties of many types of both ferrous and nonferrous metals, including such special materials as nodular iron, pearlitic malleable iron and high alloy steel, makes the extension of the market for castings through shell molding an interesting challenge to the industry. Success depends on the vision of those engaged in the manufacture of castings by that process.

But the contribution of shell molding extends beyond the use of the method itself. Regardless of the extent to which the process is used in the future to enlarge the market for castings, the tremendous interest engendered during the past eight years has done much to awaken foundrymen to the value of new methods, processes, machines and materials that will help meet the exacting demands of users of all types of castings.

Frank G. Steinebach

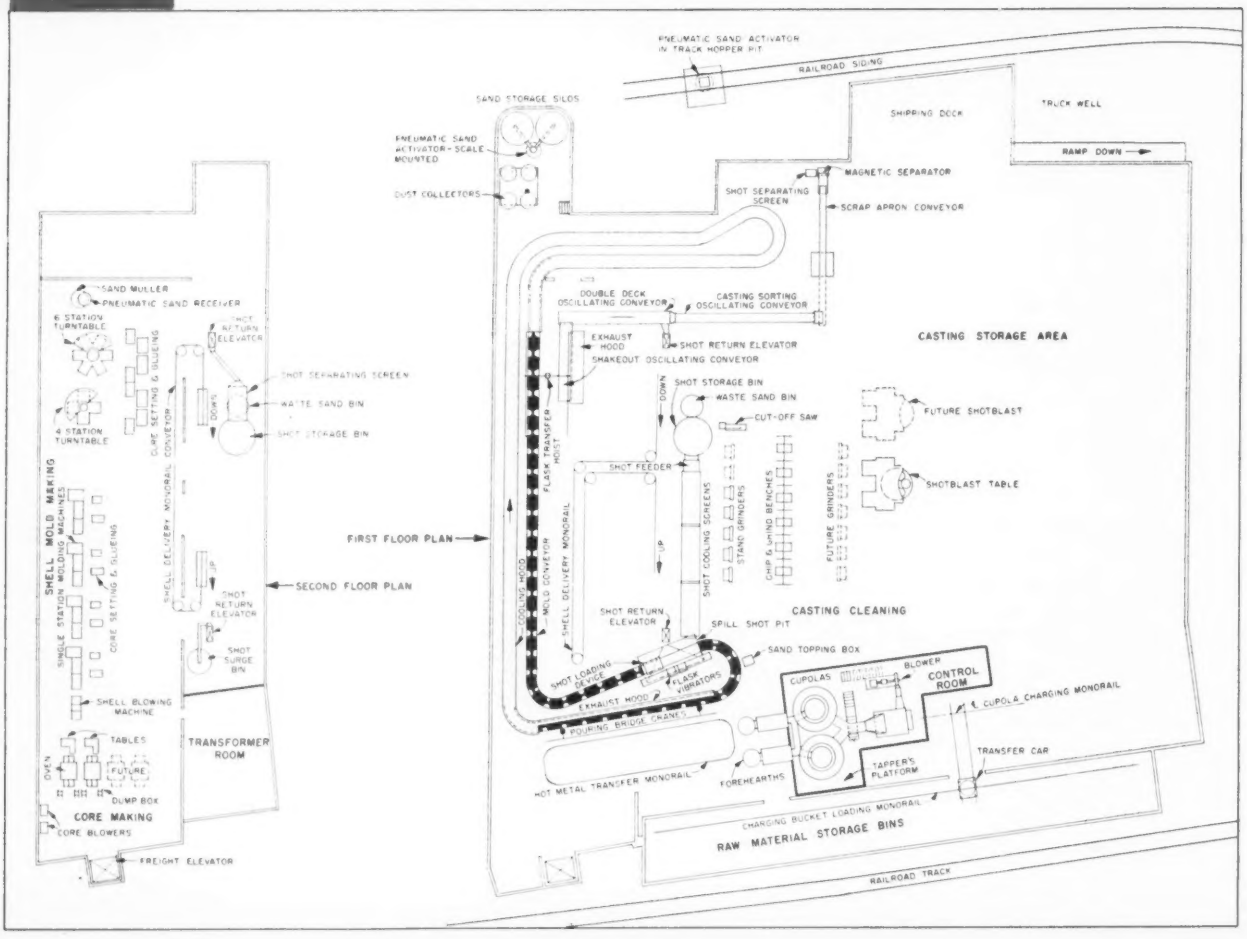
Editor

SHELL MOLDING AT



This new building, built on the site of the old Plow Foundry, houses all shell molding operations from the melting of metal to castings cleaning

Plot plan diagrams the layout of Lynchburg Foundry Co.'s newest foundry



LYNCHBURG

By ROBERT H. HERRMANN
Associate Editor

This is one of the first foundries designed, built and operated solely to produce shell mold castings. It is a mechanized, high-production, jobbing shop making gray and ductile iron cast parts

NESTLED in the tree-covered hills around Lynchburg, Va., is the new, completely integrated shell molding foundry of Lynchburg Foundry Co. A new building, designed for shell molding only, houses all operations from melting to castings cleaning.

Currently operating on a two-shift basis, the foundry has capacity for pouring 10 tons of gray and ductile iron an hour to produce shell castings ranging in weight from a few ounces to several hundred pounds, depending upon design. Some experimental parts have weighed as much as 275 lb.

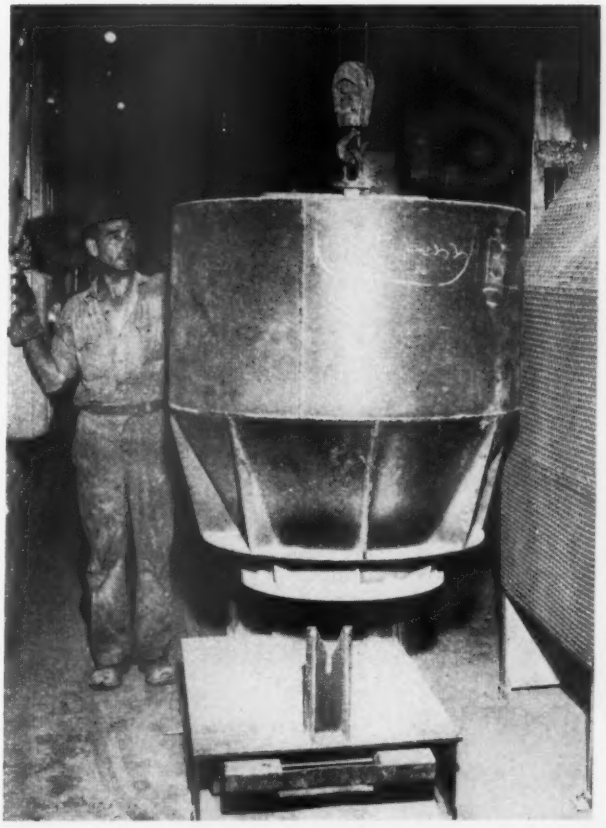
Site for the new building was obtained by tearing down the company's old Plow Foundry, making available 1¼ acres of land. The entire area is not under cover, but second floor space in the new building makes the total floor area exceed the land area by 5000 sq ft. Castings production in the new plant started this spring.

Enclosed Sand System—Dry sand of 120-130 AFS fineness is delivered to the foundry in covered hopper cars, which are positioned over a track hopper for unloading. A flexible boot is connected between the car bottom outlet and the below-track discharge hopper. Sand flows from the discharge hopper through an air-operated loading gate on the pressure chamber of a pneumatic unloading system and is discharged from the chamber in 3000-lb batches through either of two 4-in.-diam pipes to two 100-ton capacity storage silos. Electronic probes in the pressure chamber govern operation of the loading gate through contact with the sand. The system works continuously and automatically until the car is unloaded.

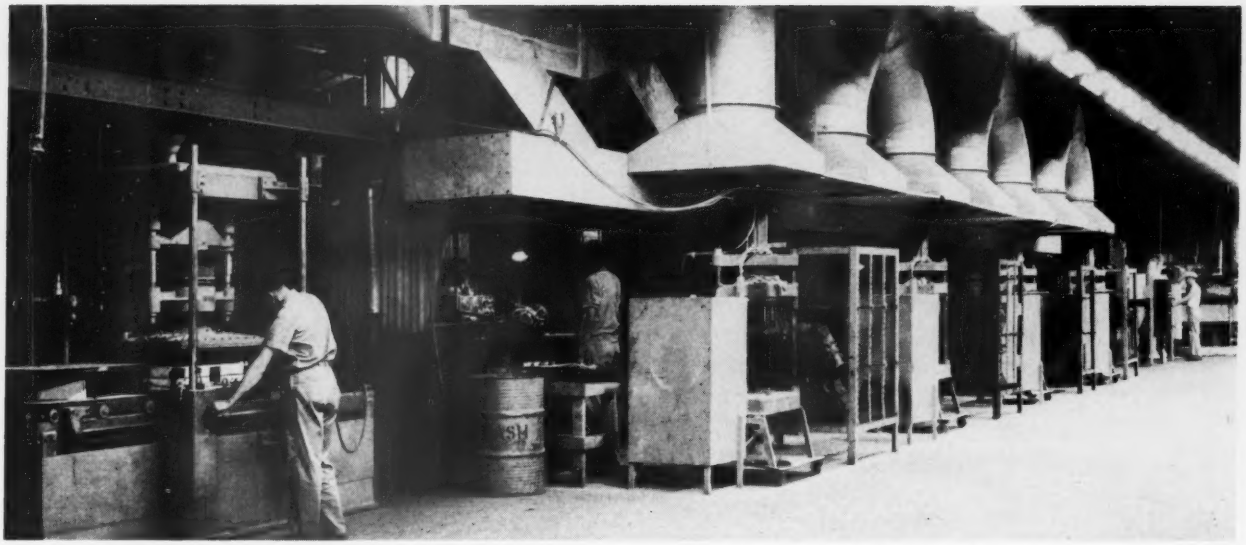
Ring orifice discharge devices developed by Lynchburg engineers blend the sand as it leaves the silos; this reverses segregation of grain sizes that occurs during handling. Sand flows from bottoms of the silos by air-gravity conveyors to the 1000-lb-capacity pressure chamber of a pneumatic delivery system for movement to the muller. The air-gravity conveyors are rectangular metal ducts, 12 in. square and about 6 ft long, sloped at an angle of 4 degrees from horizontal away from the silos. A piece of cloth is mounted inside the ducts about 3 in. from the bottom. Compressed air at 3 psi introduced to the chamber below the cloth seeps through the cloth to form a cushion on which sand in the top chamber rides. Control of air flow and adjustment of a gate at the conveyor discharge end governs sand flow rate.

The pressure chamber is mounted on a strain gage scale. This scale weighs the sand batches that are blown through 3-in. pipe to a receiving hopper above the muller on the second floor. Powdered resin is hand-dipped from drums, weighed on a small scale and added by hand in the delivery system pressure chamber. The resin addition comprises 6 per cent of the mixture. A liquid dust suppressant, comprising 1/10 of 1 per cent of the mixture, is added at the muller.

A hood over the muller carries off dust, and a



Portable hopper, filled with sand-resin mix is hoisted for placement over a shell mold machine



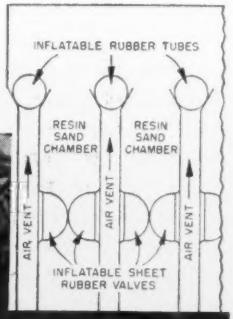
Extensive ventilating system keeps air in the molding area clear. At left is the coreblowing shuttle machine; rotary shell mold machines at right

bag-type collector above the storage hopper vents air used in moving sand and resin batches. Sand and resin particles caught in the bag filters drop back into the hopper. The entire sand batching and transporting system is enclosed from hopper car to muller.

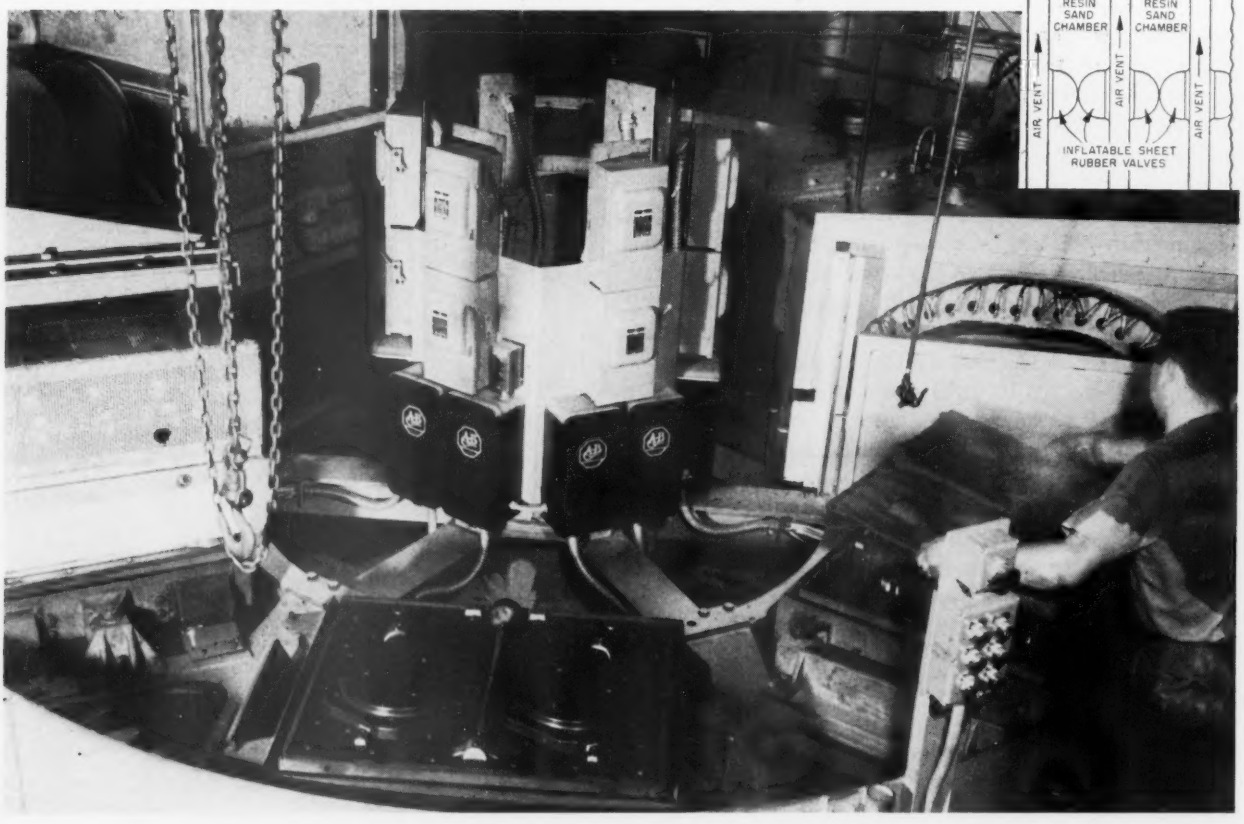
After a 15-minute mixing cycle the muller dumps the sand-resin mixture to a conical, cone-bottom bucket of 1000 lb capacity. To receive a load of sand, the bucket, while on a platform lift truck, is positioned under the muller and raised slightly to form a tight seal between its top opening and the muller discharge chute. When filled, the bucket is lowered and an operator wheels it to a shell machine, where it is raised and moved over a stationary hopper above the machine by an electrically driven overhead monorail crane.

When the portable hopper is lowered to position on the fixed machine hopper, it rests on a resilient seal on the stationary hopper opening. As the

At right, section of dump box on rotary shell machines shows valve system



Below is a general view of the six-station machine taken before ventilating ductwork was installed. Operator is removing a completed half mold



The mold halves are joined with powdered resin in swing carriage, pressure bonding machines

hoist is lowered below the sealing position, the cone bottom opens to release the sand-resin mixture. Electronic probes in the fixed hoppers indicate when an additional batch is needed.

Molding Operation—Shell making equipment is located on the second floor. It includes a six and a four-station dump box rotary machine, four shuttle dump box machines and a shuttle blow machine used for both molds and cores. All machines are located in a line along the outside wall of the building. Solid and hollow shell cores also are produced on two standard coreblowing machines as well as on two dump box units.

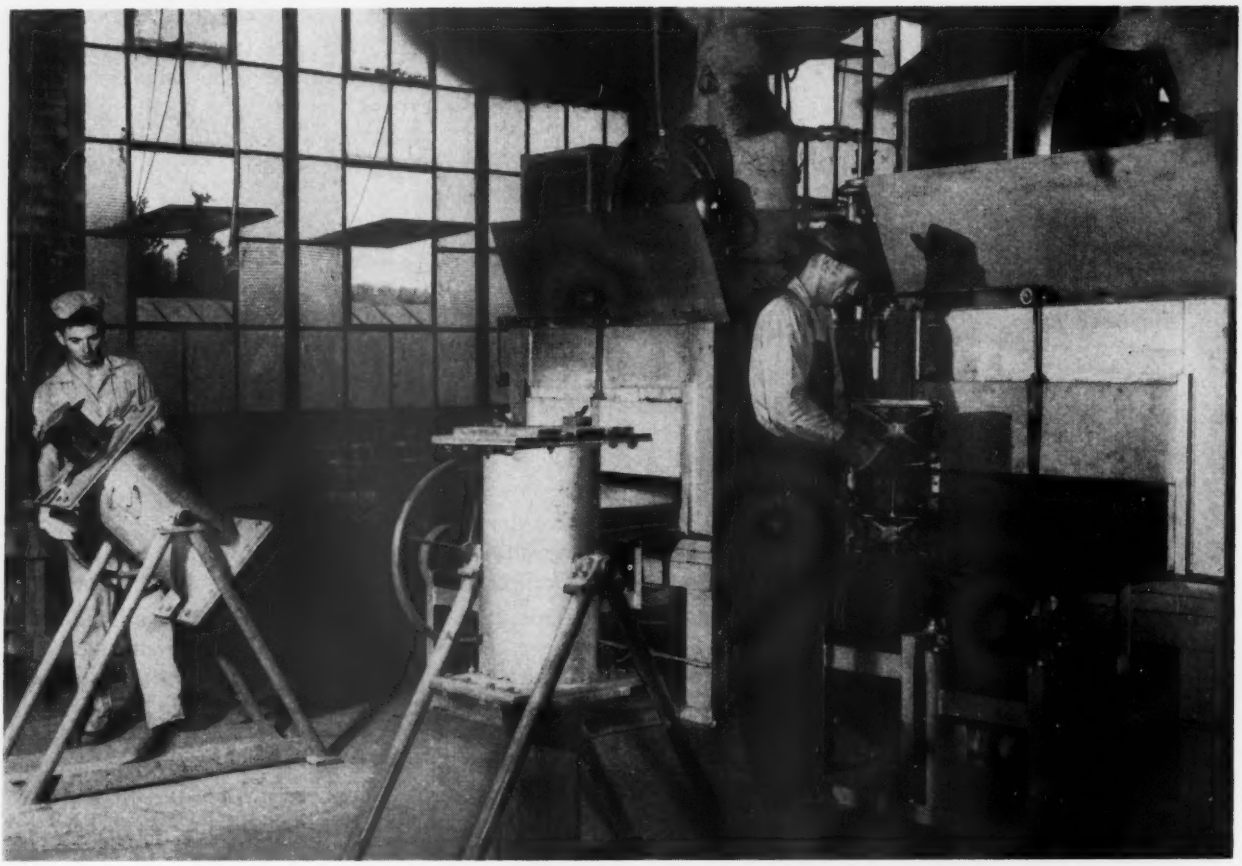
The six-station rotary machine will handle six identical or six different pattern plates measuring 24 x 30 in. Most of the patterns used are of gray iron. They are heated to 400-410°F by electrical resistance heaters attached to their backs, and are thermostatically controlled.

At the first station the pattern is cleaned and sprayed with a silicone emulsion. The hydraulically rotated table then indexes to an infrared preheat oven, which helps bring the pattern surface —particularly the high points—up to temperature. Investment of the pattern occurs at the next station. Here two pneumatically operated arms raise the plate, which is aligned on the rotating table by pin and bushing arrangement, to the water-cooled bottom rim of the dump box. A rubber valve arrangement in the box drops 8 in. of sand-resin mixture onto the pattern, where it dwells for a predetermined time, averaging about 15 seconds.

This valve arrangement consists of air-inflatable rubber tubes over air vent passages and inflatable rubber diaphragms in the sand mixture passages. Passages are formed by sheet metal. During the dump, the rubber parts are deflated, allowing the sand mixture to fall on the pattern. Turbulence of the mixture is reduced by permitting air over the pattern to exhaust itself up the vents to the storage section of the dump box.

After the dwell, the dump box and pattern assembly is rolled 180 degrees to remove excess sand-resin mixture from the pattern to the storage section. As the box leaves the storage hopper,

One man runs each shuttle dump box machine, sets cores and operates the bonding machine. Louvered ventilation openings are visible over worker



Some shell cores are made on simple dump box machines. They are cured on one belt in the ovens. Returning boxes are heated on other belt

the feed opening in the top is closed by a rubber diaphragm valve similar to those in the body of the dump box. The rubber parts in the body of the dump box are inflated just before the box rotates to original position, thus holding the sand mixture in the upper box section. The air-operated arms lower the invested pattern to the turntable, and additional mixture is added from storage hopper to upper section of the dump box through a valve consisting of a series of vanes on a horizontal, revolving rod. Operation of the valve is timed so that the same amount of mixture as was deposited on the pattern is fed into the box.

Curing of the shell takes place at the next two stations. This is done in an oven with power-operated timed doors which open during indexing and remain closed while the turntable is at rest. Heat is generated above the shell by electric resistance heaters. An operator removes the shell at the final station. This is done after it has been stripped from the pattern by pins pushed from below by a cast iron plate mounted on an hydraulic cylinder.

Adjustable Machine Cycle—During the time of this writing the machine was operating on a 40-second cycle, and cope and drag patterns were mounted alternately around the turntable. Speed of the machine can be increased to a 20-second cycle, and split patterns in which cope and drag are on the same plate can be used. Machine speed and type of pattern used depends on the type of casting being produced. It is intended that patterns with comparatively deep draws will be handled on this machine.

The four-station machine is the same as the six with the exception that the pattern cleaning and preheat stations are eliminated. Since patterns with shallow draws will be used on this machine, the preheat station is not needed, and patterns will be cleaned at the shell removal station. Both machines are fully automatic or may be operated station to station by pushbutton control.

Operators of these machines place finished shells on a table behind them. Cores, if required, are set in the drag by a second man who places it on the spring-loaded pins set in a platen on the swing carriage of a bonding machine. He then swings the carriage under a perforated tray of powdered resin. The operator deposits resin at predetermined places on the shell parting surface by means of an air vibrator attached to the perforated tray. Then the platen is swung back into place under the top set of pins in the closing machine.

Two wire hooks for later use in shot backing operations are set into grooves provided for them at the top edge of the mold half. By this time the cope is ready; it is set on the waiting drag and the bonding machine closed by air cylinder. Pressure is released after a set time and the mold is put on an overhead monorail conveyor for movement down to the first floor for pouring.

One man runs each of the shuttle dump box

machines, sets cores and operates the bonding machine. Additional men load molds on the monorail conveyor. To operate the shell machine the operator stands at its midpoint. First he cleans off and sprays the pattern, which is mounted by locking cams on a wheeled carriage. The carriage is propelled on angle iron rails by a roller chain driven by a reversible gear motor.

The push of a button sends the carriage to the right under the dump box where it is raised by air cylinder clamps to the bottom of the box. Another air cylinder actuates a lever which opens a gate to drop sand-resin mixture to the pattern. An air cylinder rolls the box over after a preset time. Just before rollover, the filler opening at top of the dump box is closed. Then, after box is inverted, the gate is closed to hold the mix in the top of the box as it returns to starting position, and the filler opening opens to pass a predetermined amount of sand-resin mixture into the box.

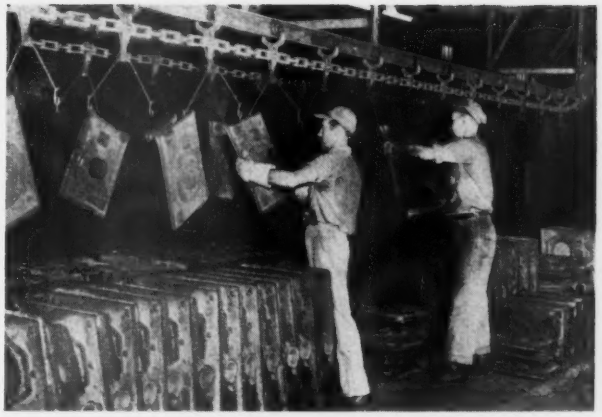
The pattern and carriage containing the uncured shell are lowered to track level and propelled across the machine to the oven where the shell is cured by electric resistance heating elements. Additional elements are mounted at the bottom of the oven to heat the pattern plate. After the cure, the carriage returns to starting position and the shell is stripped from the pattern by pins actuated from the bottom by a plate mounted on an air cylinder.

Use Core Machine Too—Next in line is the core blowing shuttle machine. Separate air cylinders move two wheeled shuttles containing electrically heated coreboxes alternately under the blowhead in the middle of the machine. The coreboxes are blown with coated sand, and, when they have been moved from under the blowhead, four pins pushed by a plate mounted on an air cylinder lift the corebox off the core. While an operator removes the core, the other corebox has been blown and moved from under the blowhead. The push of a button sends the empty corebox back under the blowhead as the operator removes the completed core from the second corebox. This machine produces cores with close-tolerance finish and also can blow intricate or detailed shell molds.

Overhead ductwork along the lines of shell and bonding machines exhausts fume-laden air. Fresh make-up air is blown in through louvered openings between the exhaust ducts along the aisle where machine operators work.

Two conveyor type, gas-fired ovens located at the end of the line of molding machines are used to bake some of the shell cores. Oven chambers are 42 in. wide, 60 in. long and 18 in. high. Cores are cured in an average time of 40 seconds at 600-700°F. Cores come through the ovens in the direction of the moldmaking machines, and near the loading ends of the ovens are grouped two standard core blowers and two dump box coremaking machines.

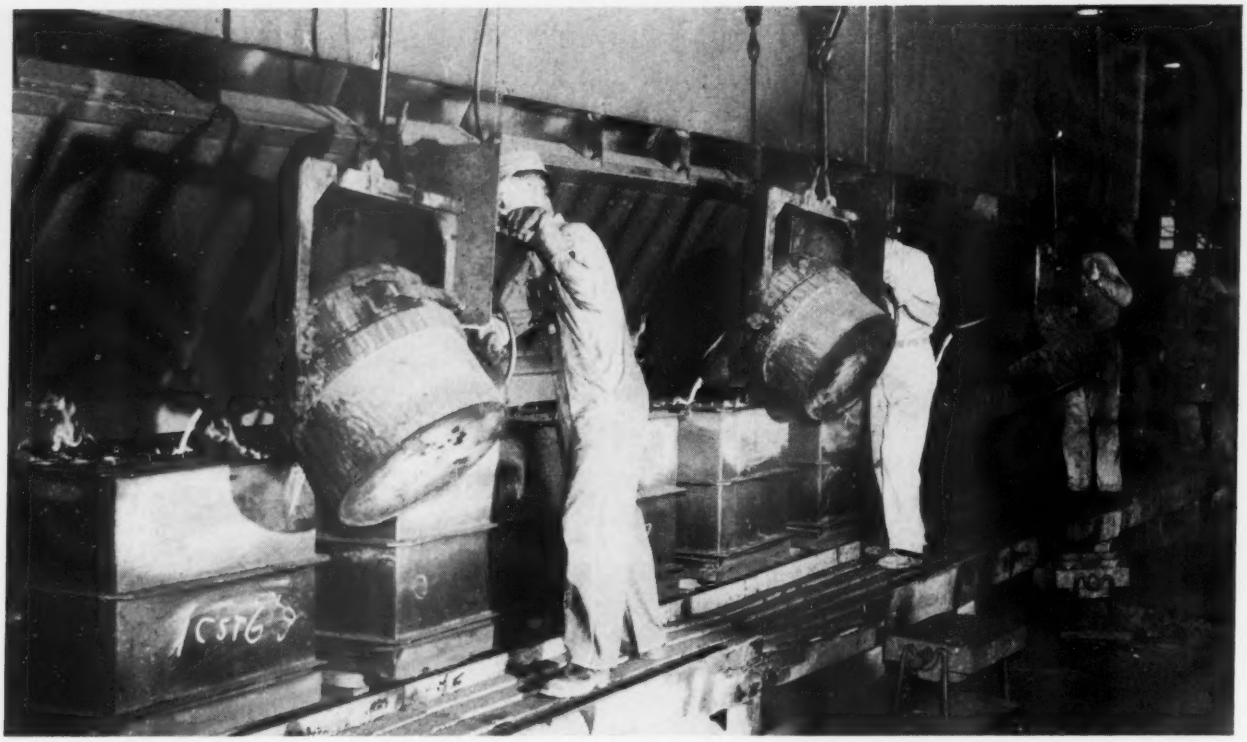
The blowing machines are adapted to blowing dry, coated sand by insertion of a slitted rubber diaphragm behind the blowplate. Its purpose is



Molds are removed from monorail conveyor on the main floor and stored prior to loading in flasks for pouring. The system pictured is temporary

An average of five molds are put in each flask. Molds are suspended from rods by hooks embedded between shell halves during bonding

Flasks are topped off with shot by hand after automatic filling by machine behind operator. Flask vibrating device is shown at lower left



The car conveyor brings molds into the 55-ft-long pouring zone, which is vented by a compensating air exhaust hood. Four men pour the molds

Open-top three-sided storage bins for coke and metal are set in a line along a railroad siding

to hold the sand mixture in the machine reservoir between blows. Heated metal coreboxes are used, and hollow cores, if desired, are produced simply by inverting the boxes after the blow.

Cure Cores in Coreboxes—Filled coreboxes are placed on the conveyor of one of the ovens, and the cured core is removed on a table at the other side. Box halves are held together during handling by cam type clamps, which also facilitate removal of the core. A return conveyor brings the boxes back through the oven, thus heating them for the next blow.

The dump core machines are simple devices made of metal cylinders 24 in. long and 12 in. in diam. Cylinders are pivoted in holders at the midpoint of their length. Sand-resin mixture is poured into the cylinder. Clamps at each end hold a plate similar to a blowplate and a corebox. Hollow cores are made by rolling the cylinder over to fill a box, then rolling it back to empty excess mix from the box and fill the box on the opposite end. Cores are cured and molds heated in the same ovens handling the blown cores.

Cores are placed from the unloading table into tote boxes or racks and transported to shell machines by platform truck.

The monorail conveyor which carries completed molds from second floor to first floor is unloaded near a car conveyor containing 167 cars. Molds are placed directly into flasks on the conveyor or into temporary storage racks. Cars on the conveyor have slotted openings which receive lugs on the hinged bottoms of welded plate steel flasks 29 x 32 x 25 in. deep.

An average of five molds are set in each flask

with the hooked ends up and hook openings pointing in the same direction. Two mold hangers, which are ½ x 1-in. metal bars with notches on the tops and hooks on the ends, are hooked over the ends of each box near the sides. Two metal rods are suspended across these hangers, and operators raise the molds and hook them on the bars, equalizing the space between the molds. A trough-shaped wooden cover is placed over the mold pouring basins.

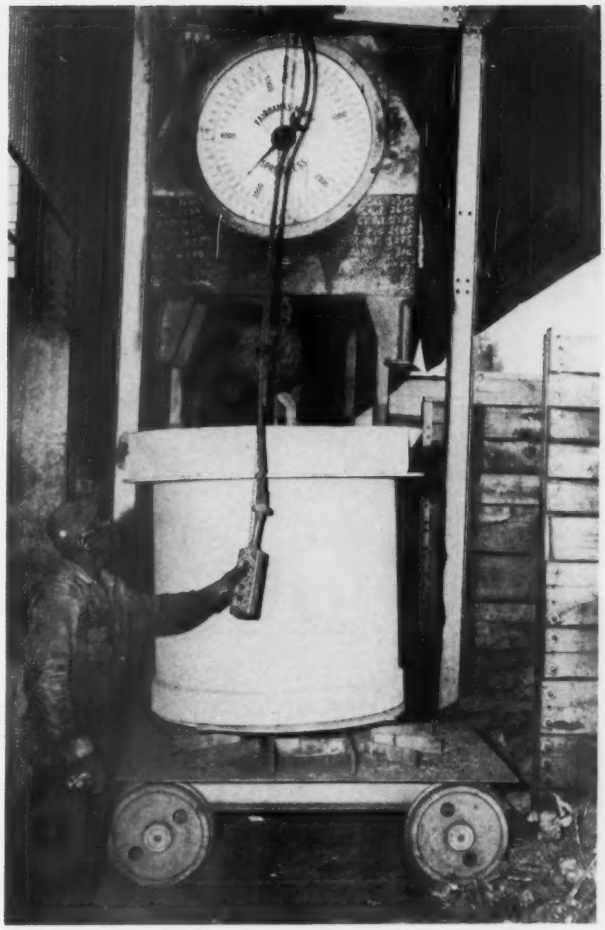
Shot Loaded Automatically—The conveyor continues on to an automatic device for loading number 990 iron shot into the flasks. This unique machine consists of a measuring hopper which travels with each flask for about 18 in. It then raises and reverses its travel to be ready for the next flask, meanwhile being filled with shot from a larger storage hopper. It works this way:

An air-actuated pin at front of the measuring hopper is extended downward to be engaged by the top front edge of an oncoming flask. As the pin is struck, two rails on which the hopper rolls are lowered by an air-operated cam device, bringing the hopper in contact with the top of the flask. Seven parallel clamshell gates, running the length of the hopper and at 90 degrees to the shell molds, open to drop the measured shot around the molds in the flask and, at the same time, the charging gates close. The loading of the flask is done while the hopper moves with the conveyor. At the end of the travel the gates are closed, the rails carrying the hopper are raised through reversal of the cam action, and three charging gates in the upper section of the hopper open to replenish shot in the measuring hopper. Then an air-cylinder ram moves it along the rails to starting position.

Just past the shot loading machine the metal rods and hangers used to hang the molds in the flask are removed by hand and the flasks are topped off with shot manually with a rubber hose. Then the flasks ride up on wheel conveyors about ½-in. above the car conveyor. Pins on the flasks, however, remain engaged with the cars to continue movement of the flasks. Vibrators automatically clamp onto a horizontal lip at the midpoint of each flask to settle the shot. Two vibrators handle every other flask and ride with it for about 8 ft. They are returned to starting position by air cylinders.

When the flasks have been lowered to the car conveyor, they are given a topping of sand to prevent spilled metal from ruining the shot. The wooden pouring basin covers are removed, and the conveyor turns into the 55-ft-long pouring zone, which is vented by a compensating air exhaust hood. Four men do the pouring.

Cupola Charge Handling—Molten metal is supplied by two cupolas. They are acid lined to 48 in. ID and operated on alternate days. Coke and metal for the cupola charges are delivered to the foundry in cars at the opposite side of the building to that at which sand is received. Metal is unloaded by magnet on a locomotive crane to open-top, three-sided bins adjacent to the tracks. Workers hand-fork coke into additional bins. Charges are made up by three men who load cone-bottom charging buckets. The buckets are carried by a weigh-type electrically driven monorail crane, which travels in a covered aisle along the open sides of the bins.



Cupola charges are made up in cone-bottom buckets on a scale-equipped electric monorail crane

Charges consist of 1000 lb of metal plus the coke and alloys. Two such charges are loaded into each charging bucket. Dividing the loads into two small charges is done to get greater coke distribution and, consequently, better heating in the cupola. To make up a 1000-lb charge, 4 to 6-in. coke is added first to the bucket, followed by steel scrap, cast scrap, pig iron and, finally, the alloy concentrates. The sequence is repeated to fill the charging bucket.

Several classes of gray irons are produced. The most typical, perhaps, is a 30,000-psi-tensile-strength iron. It contains steel scrap and malleable pig iron, with the balance made up of returns, silvery and Mn pig iron and briquets. The coke charge is 125 lb.

Ductile iron charges consist of pig iron low in Si, P, S and Mn; and steel railroad spikes plus briquets for adjusting chemical composition. The coke charge is 150 lb.

Loaded buckets are set on small, flat-top cars which are hand-pushed into the building on either of two sets of rails laid in the floor at 90 degrees

Flasks are emptied slowly onto an oscillating conveyor shakeout to avoid damage to castings

to the charge make-up aisle at its midpoint. An overhead monorail charging crane lifts the buckets about 40 ft to the level of the cupola charging door. A switch in the monorail permits the crane to serve both cupolas.

Each of the cupolas is lined to 48 in. ID with acid monolithic refractory blown in the melting zone by an air placement gun. They are designed to melt 10 tons of iron per hour. Tapping temperature for gray iron is 2900 to 2950°F and for ductile iron, 2950 to 3000°F. Cupolas are equipped with hot blast, air-weight control and fly ash collecting units.

Independent Blast Heater—The blast heater is an independently fired gas-oil unit and provides air up to 1000°F at 6750 cfm. A centrifugal blower supplies outside air to the heater at 3¾ psi. Operation of the blower is governed by an automatic air-weight control to supply the desired number of pounds of air per minute.

To date, the temperature of the air blast used at Lynchburg is 700 to 750°F for gray iron and 850 to 900°F for ductile iron. A pressure indicator on the control panel shows pressure of air in the tuyeres, and a pressure of 18-22 psi is maintained. Ducts 36 in. ID and lined to 24 in. ID with cast-in refractory carry air to the tuyeres. A motorized by-pass valve in the ductwork directs heated blast air to the outside if melting must be stopped for some reason. By-passed air is heated to desired temperature so that when melting resumes, the same blast temperature is available.

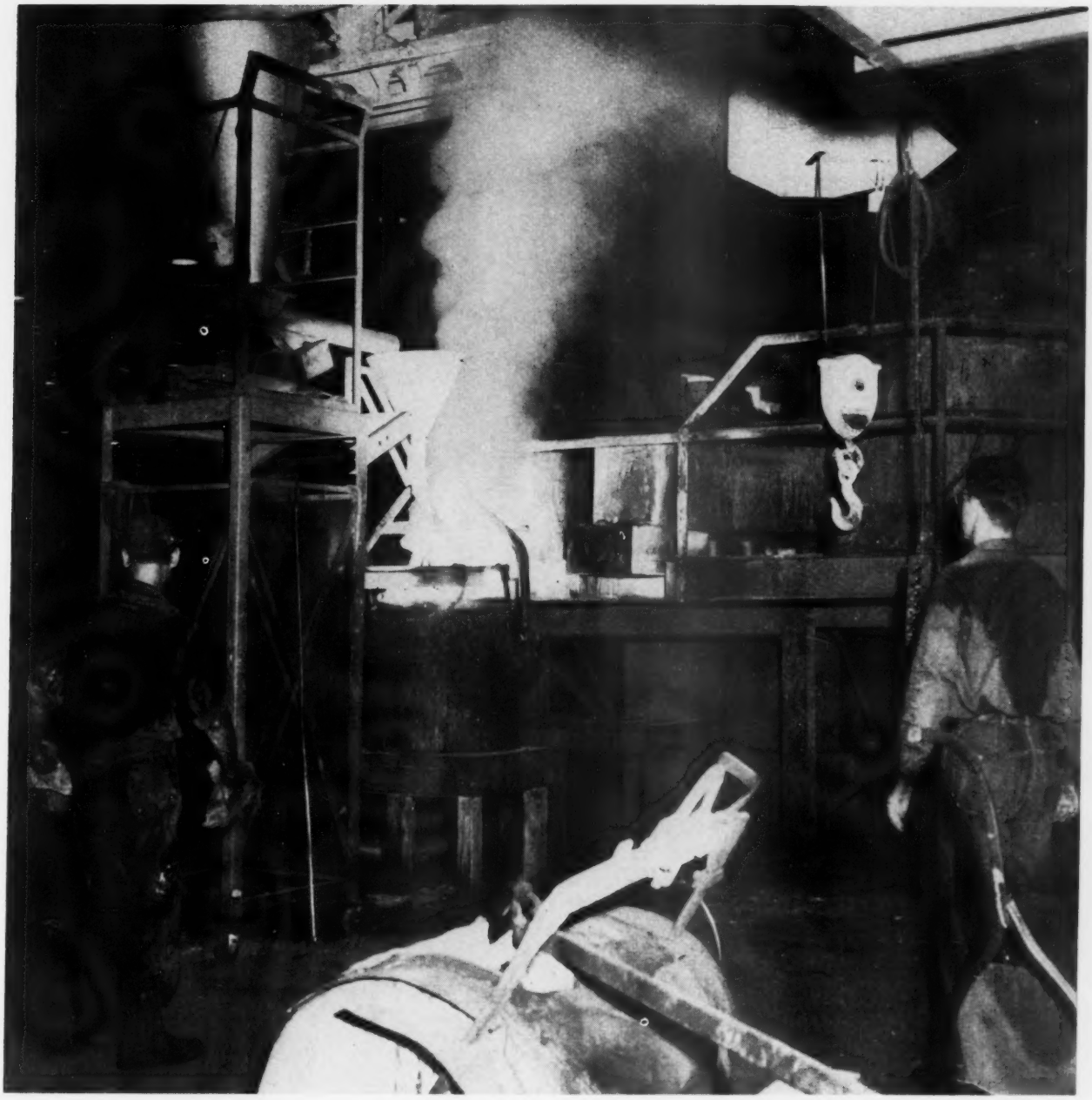
Cupolas are equipped with four, 5-in. ID cast copper tuyeres. They protrude 9 in. inside the lining and are tilted downward at an angle of 12½ degrees to keep them clear of slag and metal. Walls of the tuyeres are hollow, wall sections being ¾-in. thick. An independent, automatically controlled cooling system circulates water at 90°F through each tuyere. As a safety measure a small by-pass tube around each valve insures a minimum flow of water at 3 gpm to cool each tuyere when cupolas are operating.

A wet-type collector washes cupola gases. Return water from the unit flows in a trough to catch slag from the front slagging cupolas. A chain drag in the trough removes slag and fly ash sediment to a bucket for periodic removal by truck.

Metal Treatment—The relatively high cupola tapping temperatures are necessary because of subsequent treatment of molten metal before pouring. Metal from the cupola may be tapped into a forehearth consisting of three basins arranged in tandem, or a trough may be built across the first two basins and the metal run into the third basin, which is a 4000-lb capacity stationary storage reservoir. The other two basins each hold 2000 lb of metal. When the three basins are used, metal in the first is treated with calcium carbide to reduce sulphur content. This process involves injecting under the surface of the molten metal finely divided calcium carbide carried by a stream of nitrogen gas through a tube. The method was described in FOUNDRY, April 1953, p. 86.

Dry, granular slag developed on metal in the two treating basins is removed by mechanical slag rabbles and falls into the sluice for disposal with the cupola slag. Metal flows into the second and

Castings are sorted from this conveyor to tote boxes for movement to cleaning room operations



View of the forehearth arrangement for the two cupolas. Additions are made to bull ladles with equipment at the left to produce ductile iron

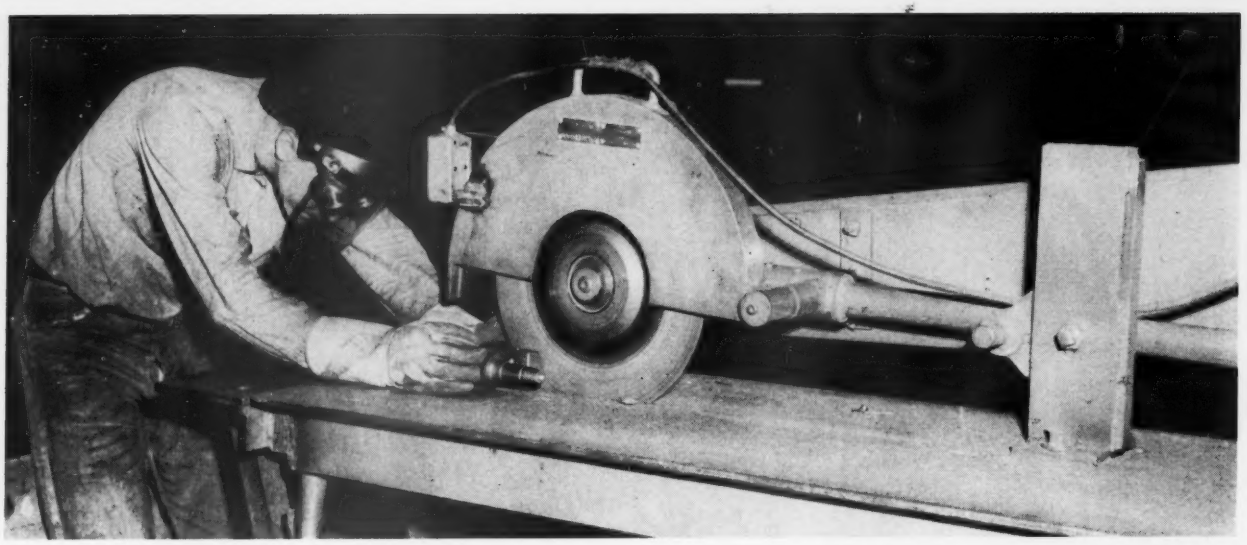
third basins through "U" tubes to prevent carry-over of slag.

Ladles ride on an overhead monorail, which has a floating section suspended on a strain gage scale in front of the reservoir. The scale dial, mounted at a convenient observation point, indicates the weight of ladle additions and makes possible accurate control of metal treatment. Ladles usually carry either 1200 or 1700 lb of metal, depending upon the type of iron and type of castings being poured.

Two bull ladles operating on a monorail loop distribute metal to pouring ladles. The cupola forehearths are at one end of the loop and the pouring line along one side. Bull ladles are electrically propelled, raised and lowered, and hand tilted. When the cupola man has filled the pouring ladles, he pushes a button on the bull ladle control and the ladle moves automatically around the balance of the monorail loop to be stopped by a limit switch just ahead of the forehearths, ready for refilling.

The 400-lb capacity pouring ladles are suspended from hand-propelled bridge cranes on a common runway. The runway is arranged so that the supply ladle passes at one end of the bridges and the mold conveyor and compensating air pouring hood are located at the opposite end. These ladles are electrically raised and lowered and manually tilted.

Poured molds travel through a 340-ft-long exhaust tunnel, and, at average conveyor speed of 5 fpm, the castings cool for 68 minutes before



Gating metal is cut from ductile iron and hard gray iron castings with a swing grinder. Castings are held on table by hand or removable vise

shakeout. The mold conveyor has a speed range of 2 to 10 fpm, and operating speed will be in inverse relationship to casting weight for a constant production tonnage.

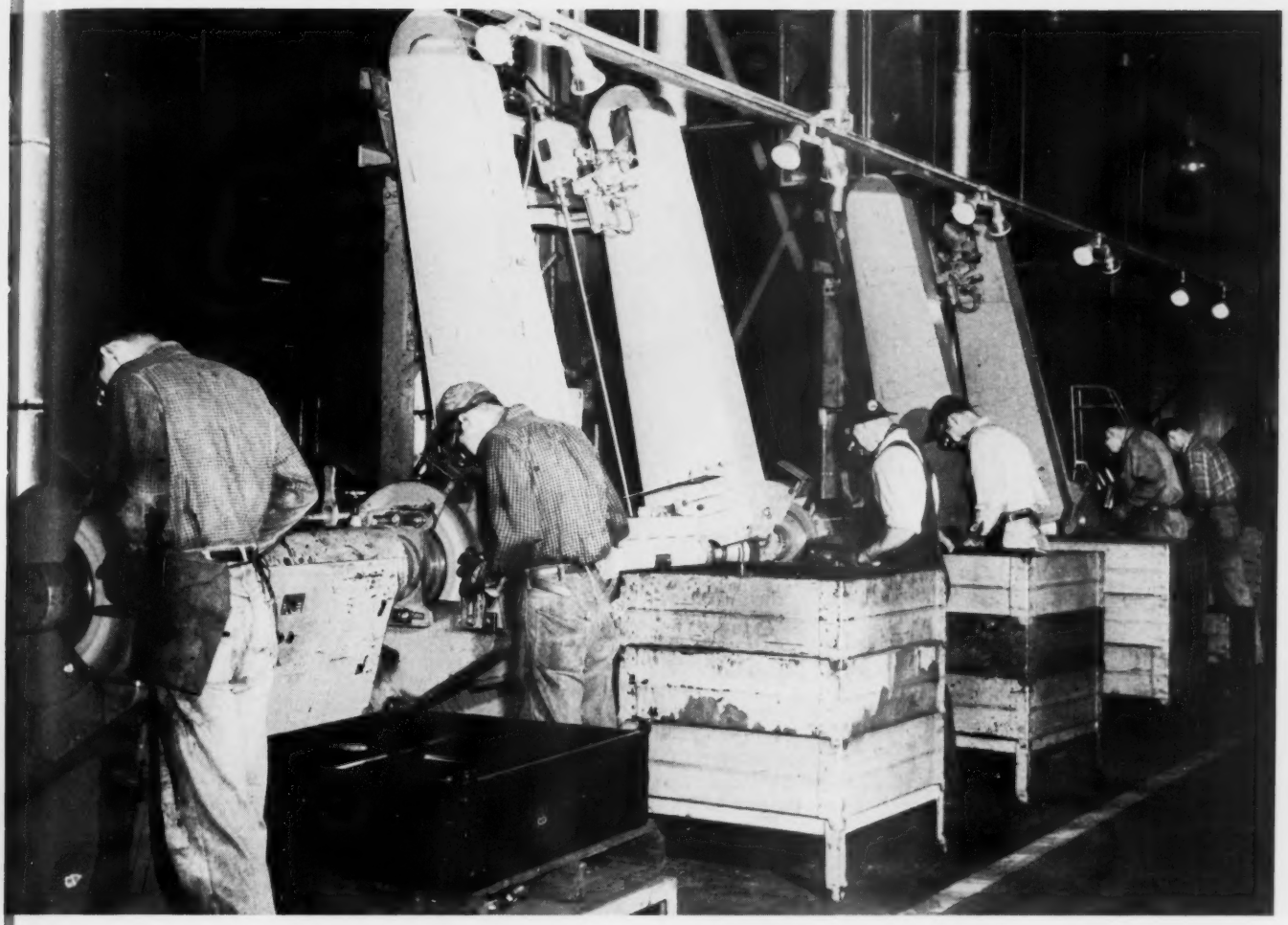
Careful Handling at Shakeout—A bail rig on a bridge-crane-mounted electric hoist is hooked onto handles on the flasks for lifting them to the oscillating conveyor shakeout. Above the conveyor is a trough-shaped support on which the flask is placed. The catch, holding the bottom in place, is released and the flask is raised gradually. Shot, shell molds and castings slide slowly onto the oscillating conveyor with minimum damage to casting surfaces. A compensating air exhaust hood over the shakeout removes smoke and fumes.

The oscillating conveyor shakeout discharges to a series of two double-deck oscillating conveyors. Upper decks of these conveyors are perforated to allow shot and sand to fall through to solid pan oscillators. Cast metal and large shell fragments are discharged from the second separation conveyor to a third oscillating conveyor from which castings are sorted into tote boxes. Most gray iron castings are sprued on this conveyor and the scrap is tossed into boxes for transportation to cupola material storage bins by electric truck.

Refuse on the sorting conveyor falls off the end to an inclined apron conveyor. It is deposited on a magnetic belt conveyor, and the separated metal is dropped on a vibrating screen to recover any shot. This screen is mounted on a scaffolding about 12 ft above the floor. Shot, shell mold fragments and scrap are separated through chutes to tote boxes resting on the floor for disposal by electric truck. Scrap goes to cupola metal storage bins, shot to the shot handling system and mold pieces to the dump. Space is provided for eventual installation of a sand reclamation system to condition all shell mold sand for reuse.

Shot and sand carried on the bottom deck of the first two separating conveyors are dumped onto a

Castings are cleaned in rotating baskets set on the 9-ft-diam table of an airless blast machine



Snag grinding is done on double-end wheel or belt grinders. Castings are moved between cleaning room operations in tote boxes by electric trucks

bucket elevator, which carries the mixture to a double deck vibrating screen above sand and shot storage bins. The top deck catches scrap metal and mold pieces larger than ¼-in. and discharges them through a chute to tote boxes on the floor. These boxes are moved by electric truck to the inclined apron conveyor feeding the separation system which handles refuse from the casting sorting conveyor.

Shot flows off the second screen deck to its storage bin and sand falls through to its bin. Air forced down through these screens carries off dust and partly cools the sand and shot before they fall into their respective storage bins. Sand used for topping shot in the flasks is taken from this bin. The remainder will go to sand reclamation when the system is installed.

Shot Is Cooled—A vibrating feeder at bottom of the shot storage bin feeds shot to the first of three 6 x 16 ft vibrating screens. The mesh is fine enough to prevent passage of the shot. The screens are step tandem mounted so that shot travels over them in a continuous stream about 1 in. deep. Bottoms of the screens are enclosed, except for 2-ft-diam openings connected by rubber cylinders to individual exhaust systems for each screen. Air drawn through the shot on the screens cools it to near room temperature. Shot traverses the screens in 65 seconds, and the system will handle 200 tons per hour. Cooled shot falls from the third screen to a bucket elevator which deposits it in the 50-ton capacity storage hopper of the flask loading device.

Electric trucks move tote-box loads of castings from the sorting conveyor to a swing grinder for removal of gating metal on ductile and hard gray iron castings. The grinder is mounted on a slotted metal-top table to facilitate sawing off the gates. Castings are held by hand or by a removable vise.

Trimmed castings are loaded into any of six 30-in.-diam rotating baskets mounted on the 9-ft-diam table of an airless blast machine. Fine steel shot, No. 170, or No. 80 grit is used to prevent damage to casting surfaces. After the first pass, castings are turned over for a second blasting.

Blasted castings are moved in tote boxes to any of three double-end grinding wheel machines or to two double-end belt grinders. Workers perform additional grinding operations on 12 benches arranged in two rows of six, back to back. Equipment at the benches varies. Hand or air vises hold the castings, and grinding is done with small wheels or

Hard-to-get-at surfaces of castings are ground with small wheels or mounted points on portable air grinders at any of twelve benches which are arranged in two rows of six each, back to back

Weighing a metal sample for routine testing in Lynchburg's well-equipped chemical laboratory

Dimensional checks are conducted on shell cast parts in a small room in the shell mold foundry

mounted points on portable air grinders. In addition, bench model, double-end grinders are available.

Visual inspection also takes place at these benches before the castings are trucked to the adjacent shipping dock for delivery. Dimensional inspection and special sampling tests are conducted in a nearby room equipped with surface tables, gages, fixtures and indicator devices. A band saw and microscope also are available for destructive testing of castings to check for porosity, inclusions and other defects.

The adjacent mechanized green sand foundry offers physical and chemical laboratory facilities. Here, regular routine chemical tests are conducted on sample coupons poured at the furnace for Si, S, P, Mn, TC, and the various alloys used. In the physical laboratory, 1.2-in. ASTM arbitration bars are checked for tensile and transverse strength, deflection and brinell hardness. One-inch keel block bars in ductile iron are tested for yield point, tensile strength, brinell hardness, reduction in area and elongation. When specifications demand, test bars are machined from castings.

A well-equipped pattern shop serves the shell foundry and the mechanized green sand foundry. Facilities are available for gating, repairing and making engineering changes in the metal patterns and coreboxes used in shell work.

Adjustments are made to the shell lift pins on a pattern in the fully-equipped pattern shop, serving the shell foundry and green sand foundry

Equipment Suppliers for the Lynchburg Shell Mold Foundry

Allis-Chalmers Mfg. Co., Milwaukee—Electric motors, starters

American Blower Corp., Detroit—Cupola blower, air weight controls, centrifugal dust collectors

American Bridge Co. Division, U. S. Steel Corp., Roanoke, Va.—Structural steel design and fabrication

Bin-Dicator Co., Detroit—Volume indicators for sand and shot storage bins

Clark Equipment Co., Battle Creek, Mich.—Electric lift trucks

Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O.—Monorail and bridge cranes

DeBothezat Fans Division, American Machine & Metals Inc., East Moline, Ill.—Air make-up and exhaust ventilating fans

Fox Grinders Inc., Pittsburgh—Abrasive cut-off machines

Fuller Co., Catasauqua, Pa.—Pneumatic sand feeders

General Electric Co., Schenectady, N. Y.—Electric motors, starters, substation equipment

Giffels & Vallet Inc., Detroit—Engineering services

Hammond Machinery Builders, Kalamazoo, Mich.—Abrasive belt grinders and polishers

Harnischfeger Corp., Milwaukee—Electric hoists

Harrison Machine Co., Wesleyville, Erie, Pa.—Shell core blowing machine

Ingersoll-Rand Co., New York—Air hoists, portable air grinders

Jeffrey Mfg. Co., Columbus, O.—Mold conveyor

Link-Belt Co., Chicago—Oscillating conveyors

Mechanical Handling Systems Inc., Detroit—Overhead trolley conveyor

Modern Equipment Co., Port Washington, Wis.—Ladles

National Engineering Co., Chicago—Sand muller

Pangborn Corp., Hagerstown, Md.—Shot blast table and cabinet, dust collectors

Robins Conveyors Division, Hewitt-Robins Inc., Passaic, N. J.—Shot and sand screens

Robbins & Myers Inc., Springfield, O.—Electric hoists

Robinson Air Activated Conveyor Systems, New York—Pneumatic sand handling systems

Ruppe Industries, St. Clair Shores, Mich.—Flask vibrators

Claude B. Schneible Co., Detroit—Cupola collectors and slagging equipment

Shell Process Inc., Chicopee, Mass.—Shell making machines, bonding presses

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.—Hoists

W. W. Sly Mfg. Co., Cleveland—Dust collector

Standard Electric Tool Co., Cincinnati—Snagging grinders

Stearns Magnetic Inc., Milwaukee—Magnetic pulley and floor sweepers

Streeter-Amet Co., Chicago—Electronic scales

Syntron Co., Homer City, Pa.—Shot feeder, electric vibrators

Thermo-Projects Inc., Division Todd Shipyards, Elmhurst, Queens, N. Y.—Cupola blast heater and controls

Webster Mfg. Co., Tiffin, O.—Shot and sand elevators, chutes, bins, conveyors, feeders, screens

Westinghouse Electric Corp., Pittsburgh—Power substation

Whiting Corp., Harvey, Ill.—Cupola charging crane and buckets

Yale & Towne Mfg. Co., Philadelphia—Hydraulic hand lift trucks

Castability of Aluminum Alloys

Here are the results of experiments on the castability of aluminum alloys and the factors which affect this property. Spiral test castings were employed to measure running qualities

By M. M. KARNOWSKY
Sandia Corp.
Albuquerque, N. M.

Fig. 1—Spiral test castings were made with each of four alloys throughout a range of seven temperatures. Results are shown in this illustration

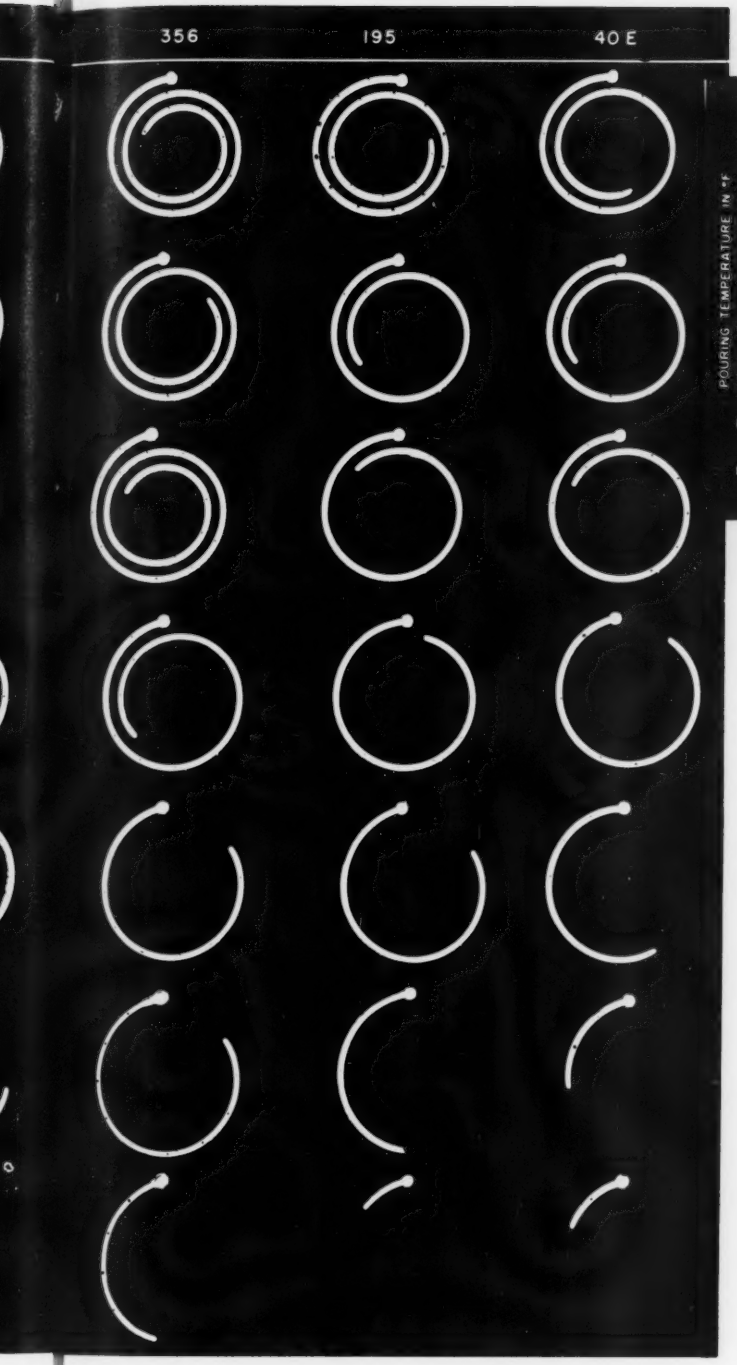
WHEN AN alloy must be specified for a complex shape, such as the cast aluminum cooling fins on an aircraft engine, the relative pouring qualities or castability of the available alloys is critically important. Unfortunately, there are no convenient handbooks or tables to which the foundryman or designer can turn for guidance. In the foundry at Sandia Laboratories, a test casting has been used to obtain information on the castability of aluminum alloys and the factors which affect this property. The results of these limited studies are presented in the hope that they will stimulate discussion and comparison.

The test casting method is by no means new. About 25 years ago a casting for this purpose was devised by C. M. Saeger Jr. and A. I. Krynitsky; it was described by them in a paper presented before the 1931 convention of the American Foundrymen's Association. The unique feature of the mold described by Saeger and Krynitsky is that it embodies a spiral cavity into which the molten metal can flow. The length of the spiral casting is a measure of the running qualities of the metal at the time it was poured.

Such a special mold was used in the Sandia Foundry to study four commonly used aluminum alloys:

1. Al-Mag 35 (a 7 per cent magnesium alloy).
2. 356 (a 7 per cent silicon, 0.3 per cent magnesium alloy).
3. 195 (a 4.5 per cent copper, 1.2 per cent silicon alloy).
4. 40E (a 5.5 per cent zinc, 0.6 per cent magnesium of high as-cast strength).

Variables Affect Results — Interpreting the results obtained by the spiral test-casting method is complicated by the fact that variables other than the properties of the metal affect the length of the spiral. The manipulation of the pouring ladle, for example, affects the initial pressure and hence the length of the spiral. The principal variables include temperature, viscosity, rate of heat exchange, friction losses and the properties of the metal itself.



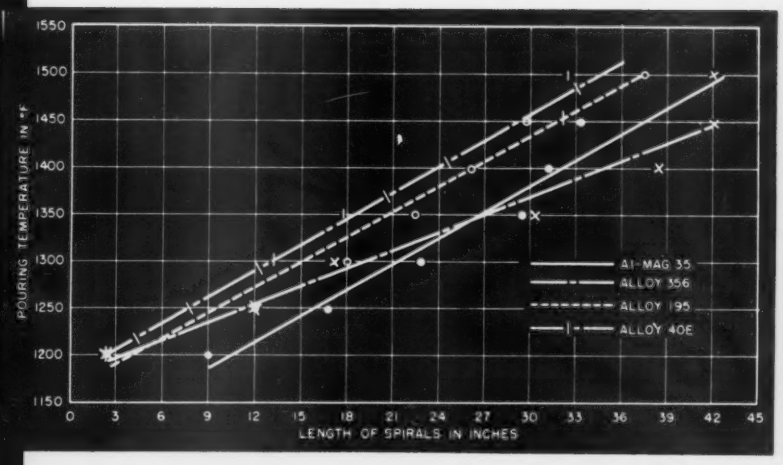


Fig. 2—In general, the length of the spirals in all four alloys decreased with the temperatures

The studies described here were undertaken to measure the effect on castability of some of the controllable factors which are generally considered most important by foundrymen. Specifically studied were the effect of (1) the casting temperature of the metal, (2) the moisture content of the molding sand, (3) the degassing of the metal and (4) the venting of the mold.

The results show, as was expected, that for all of the alloys tested the castability varies more or less directly with the casting temperature. The other three factors were found to have little or no effect on castability. The details of the mold used and a casting made with it are shown in Figs. 3 and 4.

Effect of Temperature—To measure the effect of temperature, two castings were made with each of the four alloys through a range of seven temperatures. The spirals shown in Fig. 1 are in each case the longer of the pair. The average length of each pair was then taken and the data compiled in Table I. In general, the length of the spirals for all four alloys decreases with a decrease in temperature (Fig. 2). A rather marked difference is to be noted, however, in the maximum length achieved with the different alloys and in the relative performance of each at the various temperatures. Alloy 356, for example, attains its maximum fluidity at a lower temperature than does Al-Mag 35. Information of this kind is useful, since the lowest temperature at which a mold can be filled is usually the most desirable pouring temperature.

TABLE I—Average Length in Inches of Spirals for Different Alloys vs Temperature of Pouring

Temp	Al-Mag 35	195	356	40E
1500° F	42.7	37.4	42.0	32.5
1450° F	33.2	29.8	42.0	32.3
1400° F	31.1	26.0	38.5	24.5
1350° F	29.4	22.5	30.3	17.8
1300° F	22.8	18.0	18.0	13.3
1250° F	16.8	12.0	17.1	7.8
1200° F	9.0	2.5	9.0	2.5
Degassed with	Cl_2	N_2	N_2	N_2
Per cent moisture in sand	6.3%	6.3%	6.8%	5.7%
Solidus (approx)	1080° F	1020° F	1075° F	1060° F
Liquidus (approx)	1150° F	1195° F	1130° F	1140° F

Effect of Degassing — The extent to which an alloy has been degassed is one of the variables about which there is much speculation. Several sets of spirals were poured to learn the effect of degassing on the castability of an alloy. At each of the seven temperatures, a spiral made with Al-Mag 35, degassed by the chlorine technique, is matched with a spiral made with the same alloy not degassed. The results, compiled in Table II, indicate that the effect of degassing is not significant.

The order of pouring is shown in each column

in Table II. Before the first series of spirals was poured, the metal was melted and heated to 1500° F. As the metal cooled, a spiral was poured at each of the predetermined temperatures. To preclude the possibility of pouring only spirals with metal saturated at the highest temperature, the procedure was then reversed. The metal was melted and heated to 1300° F and a pour made. Between subsequent pours, the temperature was raised to the predetermined levels.

Effect of Moisture Content of Sand—The effect of the moisture content of the molding sand is another factor widely considered to be of importance. This variable was controlled and a series of pours made with Al-Mag 35. The results (Table III) indicate that, within the range studied, the effect of the moisture content of the sand on the length of the spiral is not significant.

The best results, however, were obtained with the 6.3 per cent sand. This is of interest because, though the foundry personnel had difficulty maintaining moisture content of 4.5 per cent and 9.5 per cent, they had no such difficulty with the more desirable percentage.

TABLE II—Effect of Degassing on Running Qualities of Al-Mag 35

(Length of Spirals in Inches)

Temp, ° F	—Degassed with Cl_2— Spiral Length	Order of Pouring	——Not Degassed—— Spiral Length	Order of Pouring
1500	42.7	1st	37.2	1st
1450	33.2	2nd	35.0	2nd
1400	31.1	3rd	38.8	3rd
1350	29.4	4th	27.3	4th
1300	22.8	5th	19.8	5th
1250	16.8	6th	14.8	6th
1200	9.0	7th	6.1	7th
1500	42.0	3rd	42.0	6th
1450	...	...	35.0	5th
1400	31.3	2nd	38.8	4th
1350	...	...	27.3	3rd
1300	20.8	1st	19.8	2nd
1250	...	...	14.8	1st

TABLE III—Effect of Moisture Content of Sand vs Length of Spirals Produced with Al-Mag 35

(Length of Spirals in Inches)

Temp, ° F	Per Cent Moisture 4.5	6.3	9.5
1500	35.5	42.7	34.3
1450	35.9	33.2	35.3
1400	30.0	31.1	31.5
1350	26.4	29.4	23.8
1300	11.5	22.8	18.5
1250	6.4	16.8	10.5
1200	3.0	9.0	5.5

TABLE IV—Effect of Venting Mold on Length of Spirals, Al-Mag

	Vented Mold	Not Vented
1500° F	36.8	42.7
1450° F	32.5	33.2
1400° F	31.0	31.1
1350° F	25.0	29.4
1300° F	17.0	22.8
1250° F	10.0	16.8
1200° F	5.0	9.0
Per cent moisture	6.9%	6.3%

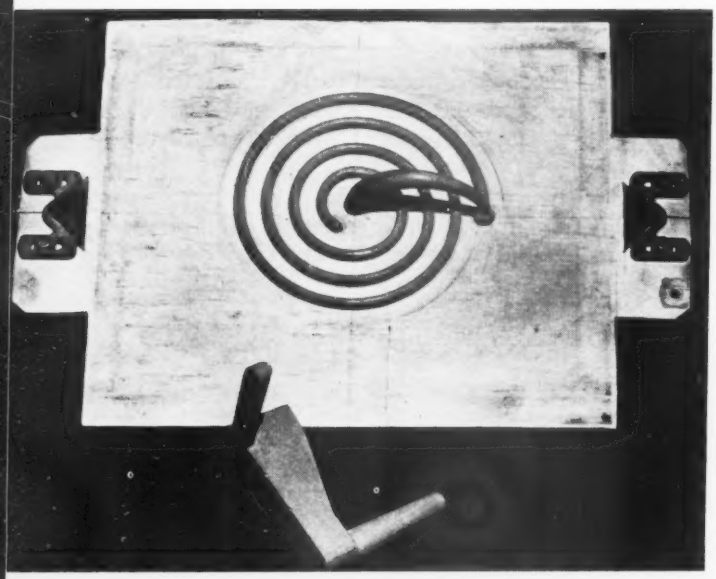


Fig. 3—Matchplate of pattern for test castings is shown with the reversed horn-gate attached

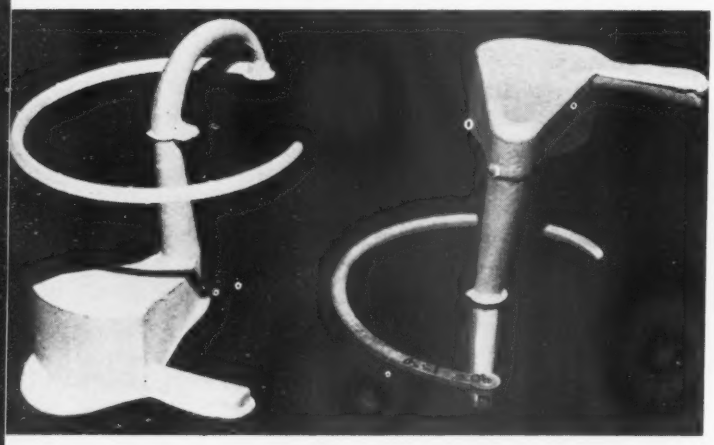


Fig. 4—Illustration shows two spiral castings typical of those made in the Sandia experiments

Effect of Mold Venting—To evaluate the effects of the compression of gas in the molding cavity, a series of pours was made with a specially vented mold. A "whistler" or single vent was provided through the sand in the cope to the end of the spiral to permit gas to escape. Control pours were made in which all conditions were duplicated except that the mold was not vented. The results (Table IV) show that venting had no noticeable effect on the length of the casting.

The studies described here are obviously too limited in scope and number of samples to warrant extensive generalization. But the results do show that such tests can be used to determine the range of suitable alloys (with respect to castability) for a specific application. This information can be critically important if either availability or price differential is a consideration.

Moreover, the test results illustrate the practicality of this method for testing various suppositions about casting. The results with the last three variables tested, for example, indicate that these three variables may be safely ignored so far as castability is concerned. The marked spread in the data, on the other hand, indicates that such basic factors as the design of the basin, sprues, gates, and risers and the manipulation of the pouring ladle are important determinants of foundry results.

(Third in a Series)

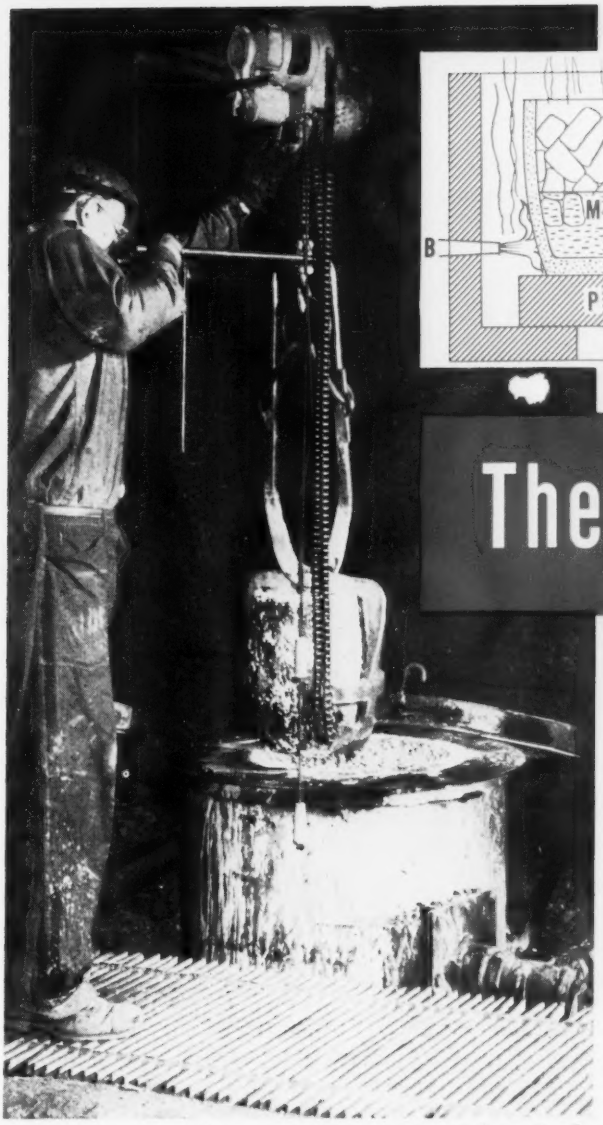


Photo courtesy of Stroman Furnace & Engineering Co.

Melting Furnaces in The Brass Foundry

By HARRY ST. JOHN
Foundry Consultant

Fig. 1—Gas or oil-fired lift-out type crucible furnaces require low investment cost and offer flexibility. In the diagram, B is the burner, oil or gas, P is the pedestal and M the metal

THE function of the melting furnace is to convert fuel into heat and to apply that heat efficiently to metal in such a way as to melt and superheat it without impairing its quality. To accomplish this, a variety of fuels and several different furnace types in various sizes are available. It is the foundryman's problem to select the fuel and furnace which best suit his requirements.

In every foundry—large or small, jobbing or captive—the same factors must be dealt with but they are of varying consequence and must be dealt with in varying ways in different foundries. Particularly in the brass foundry industry, there is so wide a variation in the composition of alloys used and in the character of castings made that no one type of furnace can be expected to produce the best results at all times. Elemental considerations, the importance of which must be weighed for each individual case, may be listed as follows:

1. Quality of metal. This is of course always an essential. Properly operated, all furnaces and fuels now in use are capable of producing metal of excellent quality.

2. Working conditions. Of increasing importance, this element is under fair control in most modern foundries, regardless of what furnace is used.

3. Operating cost. Of top importance and it differs greatly in different furnace types and sizes.

4. Investment cost. One foundry may install melting equipment costing only a few hundred dollars per molder, another may spend thousands. Both may be right but it is possible for either to be very wrong.

5. Flexibility and convenience. The ability to switch from one alloy to another, or to supply metal in large or small quantities, as required.

6. Maintenance cost.

7. Maintenance skill. This requirement is widely variable with different furnace types and is exceedingly important.

8. Operating skill. Any melting operation requires skill, but the kind of skill needed is not the same in all cases.

Furnace Fuels—The fuels in general use include coke or coal, gas, oil and electricity. These are empoyed in several different ways. The fuel may be intimately mixed with the metal to be melted, as is done in coke-fired cupolas and electric induction furnaces. Burning fuel may be brought into direct contact with the surface of the metal as is done in direct-flame gas and oil furnaces. In steel foundries this is also accomplished with the electric arc but nonferrous alloys are too volatile to withstand so intense a heat.

The metal to be melted may be in a container surrounded by burning fuel as in most crucible furnaces. Or the heat source may radiate to the

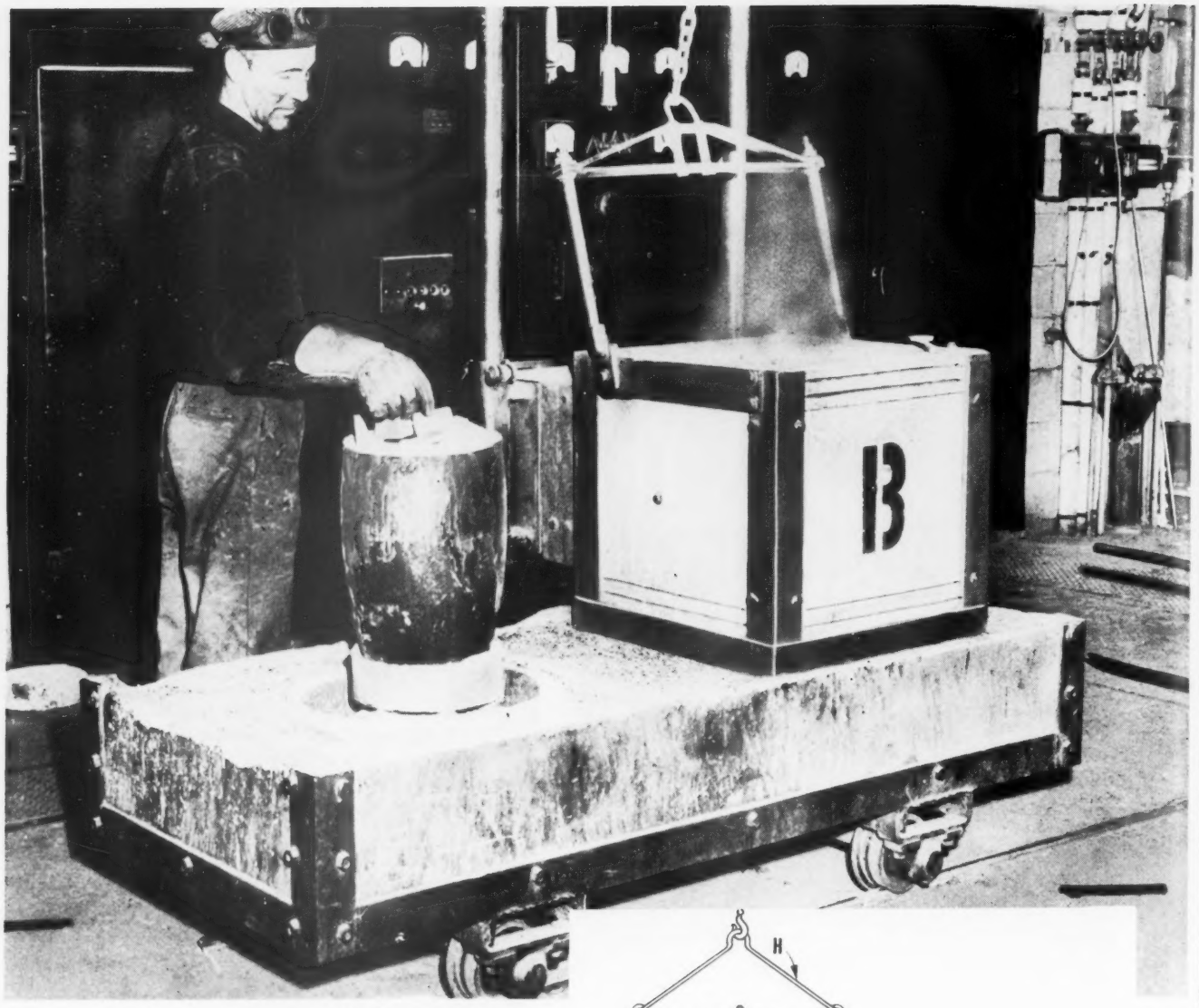


Photo courtesy of Ajax Electrothermic Corp.

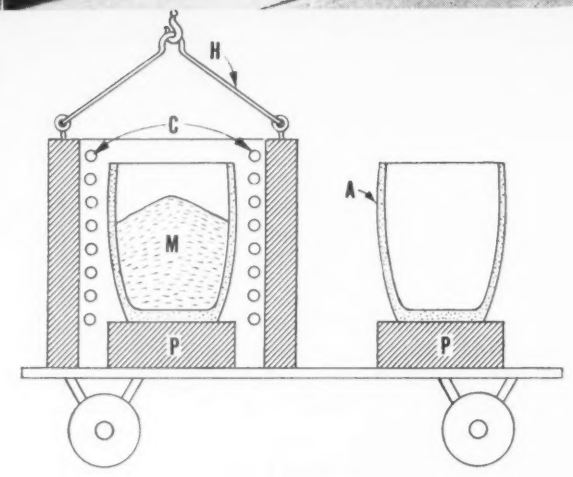


Fig. 2 — High-frequency electric lift-coil furnace is flexible and convenient. In diagram, C is the primary coil, M the metal, P the pedestal, H the hoist and A the alternate crucible

surface of the metal without touching it as in the indirect-arc furnace. Additional heat units may be picked up by flowing the metal over a heated surface, as in cylindrical furnaces, electric or fuel-fired, which rock or rotate during melting.

Lift-out Crucible—Crucible melting dates from prehistoric times and still holds an important place in the industry. To be sure, the lift-out crucible, fired with coke or coal, which prevailed a half-century ago, has almost disappeared. The modern lift-out furnace is fired with gas or oil as are the tilting crucible furnaces.

The outstanding characteristics of the fuel-fired lift-out crucible shown in Fig. 1 are low investment cost and flexibility. Both of these factors make it suitable for use in small jobbing foundries or for intermittent use in larger establishments. Of all possible furnaces, it is the cheapest to build and, because of its simple construction, maintenance costs are low and maintenance skill at a minimum. It is completely flexible since, if a change of alloy is desired, it is only necessary to use a new crucible or one which has previously been used for the same alloy. Small quantities of metal are easily prepared, but large quantities not so conveniently since crucibles larger than No. 90 (capacity about 270 lbs) are troublesome to handle.

Because of their small size, lift-out crucibles are not adapted to mechanization and their operating cost is probably higher than that of any other furnace type. Working conditions are not of the best. The handling of "hot pots" hour after hour appeals less and less to present-day labor. If the operation is intermittent, this is not so much of a factor. The coke-fired furnaces formerly in gen-

eral use required experience and what might be called "culinary" skill on the part of the melters, but this is not so true of oil or gas-fired furnaces. Metal of good quality can be produced without difficulty by the observance of a few simple precautions.

One type of crucible furnace in the lift-out class, illustrated in Fig. 2, equals the common lift-out in flexibility and even excels it in convenience. Otherwise the resemblance is slight. In the high-frequency electric lift-coil furnace an electric coil is lowered around a crucible on its pedestal by means of a hoist. The passage of high-frequency current (1000 or 3000 cycles) through the coil sets up electric eddy currents in the metal, thereby generating heat so rapidly that a full charge can be melted and superheated in a few minutes from a cold start. When the metal is ready the coil is hoisted out of the way and the crucible can conveniently be lifted and carried to the molds. During the pouring of this first crucible a second crucible may be wheeled into place and the coil lowered around it. The furnace is thus back at work with a minimum of delay.

Flexibility and Convenience Ideal

Here obviously flexibility and convenience are ideal. The ability to melt rapidly from a cold start is sometimes a great advantage. Working conditions are good since there is no need to stoop over a hot furnace, and the outer surface of the crucible does not get nearly so hot as the metal within it. Another feature of this furnace is that the electromechanical effect of the induced eddy currents causes the metal to boil, thereby mixing its components thoroughly.

Like other small crucible furnaces, the high-frequency lift-coil type is not well suited for volume production or the quantity preparation of metal for very large castings. A disadvantage in comparison with other crucible furnaces lies in the exceedingly high investment cost. The comparative simplicity of the furnace construction is more than offset by the complexity of the electrical equipment required to produce high-frequency alternating current. The overall cost of a furnace capable of melting some 5000 lb of metal in an eight-hour day is in the neighborhood of $20,000, which is considerably higher than the investment cost of any other furnace of like productive capacity.

Its operating cost also suffers somewhat in comparison with other electric furnaces because it is necessary to water-cool the primary coil, which for the purpose is constructed of copper tubing. To operate effectively, the coil must be placed very close to the melt, and although the passage of current through it does not heat the coil appreciably, it has to be protected against the flow of heat outward from the melt through the wall of the crucible. Maintenance of the furnace is not much of a factor but there must be someone in the plant who thoroughly understands the electrical equipment which supplies high-frequency current and is able to service it properly.

Tilting Crucible—Tilting crucible furnaces are less flexible than lift-out furnaces and somewhat more costly to install, but because of their greater capacity, are better suited to large-scale production. Fig. 4 illustrates how a crucible of melting capacity up to 600 lb or more is permanently mounted in a furnace shell lined with refractory and fired with gas or oil. Operating costs are lower than with the lift-out type, and some degree

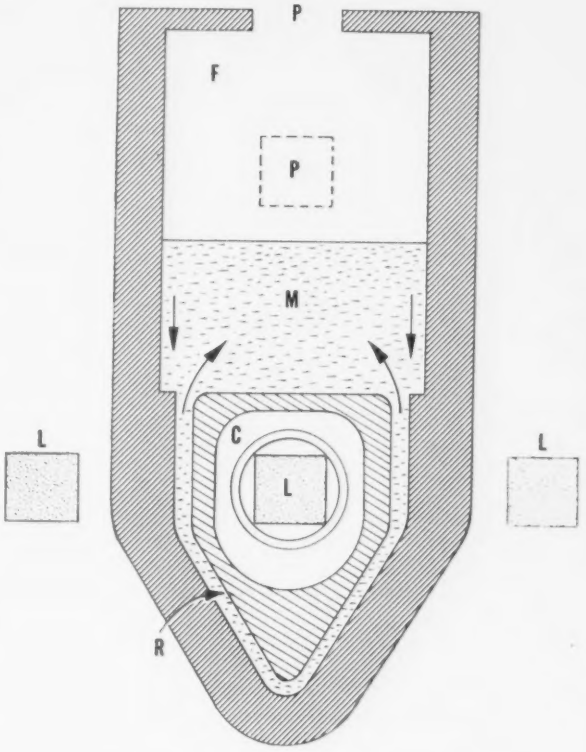


Fig. 3—Low-frequency induction furnace is commonly used. C is primary coil, L the laminated iron core, R the secondary circuit channel, PP the ports, F the main chamber and M the metal

of mechanization is possible. Change of alloy requires only that the crucible be scraped clean of any adhering dross and metal before it is put back into use.

Since the crucible is not removed for pouring it suffers less from handling and yields a relatively longer life than the lift-out crucible. Also it loses little heat and consequently operates more efficiently. Failure of the crucible, however, means shutting down the furnace until it can be cleaned out and the crucible replaced. Since the furnace must be charged in increments the operator is exposed to considerable heat, and working conditions are only fair. Unless the space between the furnace wall and the crucible are proportioned correctly, excessive noise is also a factor.

Induction Furnaces—High-frequency electric induction furnaces are built in the tilting crucible type. They share with the lift-coil type the disadvantage of high investment cost but can be made in much larger sizes, up to 2000 lb or more. In flexibility they are on a par with other crucible tilting furnaces but, since there are no hot com-

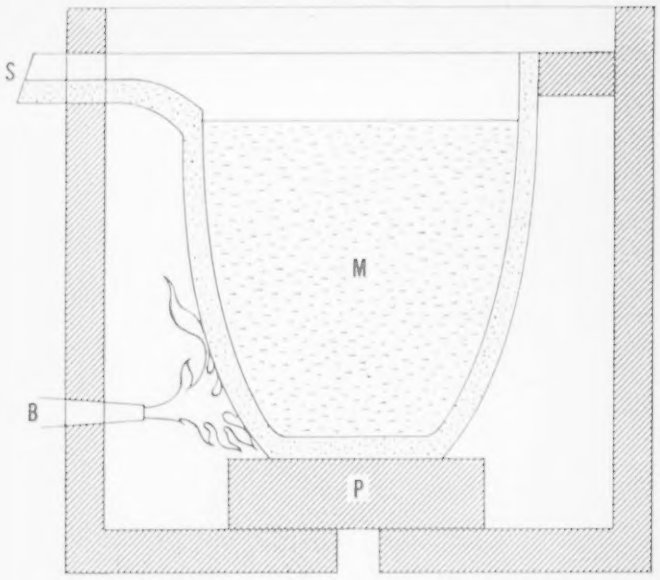


Fig. 4—Tilting furnaces are well suited to a large-scale production because of their capacity. In the diagram, B is the oil or gas burner, M the metal, P the pedestal and S is the spout

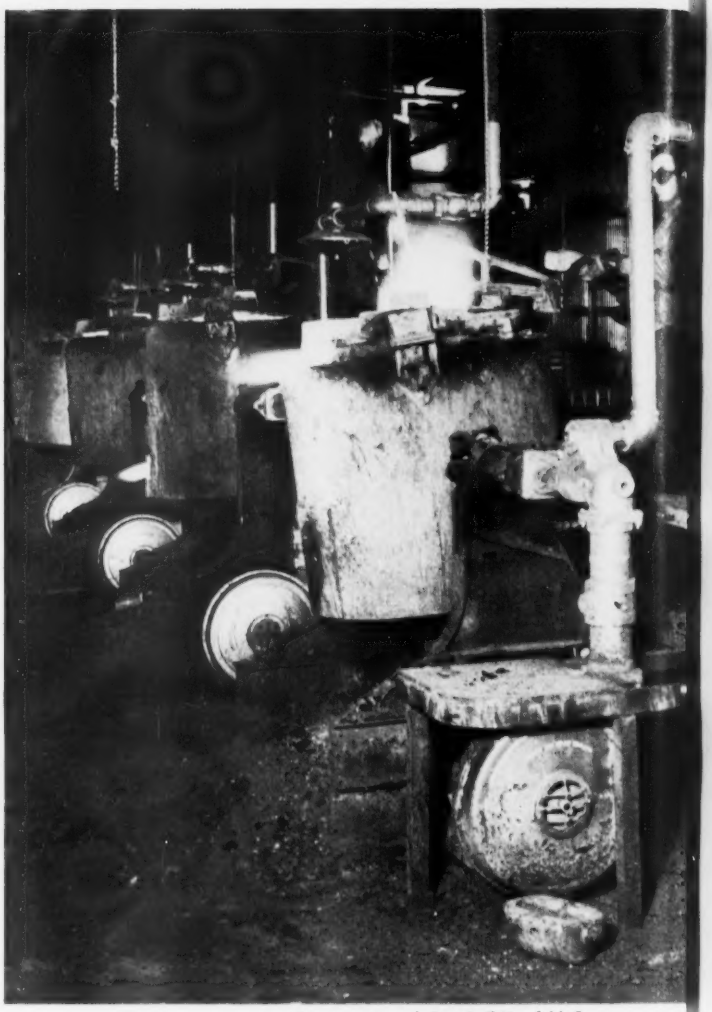


Photo courtesy of Campbell-Hausfeld Co.

bustion gases and no noise, working conditions are more favorable. Ease of analysis control makes these furnaces particularly suitable for melting stainless steels and the high-nickel alloys such as monel. They are sometimes recommended for copper-base alloys but are not widely used in brass foundries.

A more commonly used electric furnace is the low-frequency induction furnace. This is built on the principle of an electric transformer and utilizes ordinary voltages and frequencies, usually 60 cycles at 440 volts. Referring to Fig. 3, a primary coil energizes the secondary circuit by means of a laminated iron core. The secondary circuit consists of molten metal occupying a V-shaped or U-shaped channel of refractory material. At the top of this channel the circuit is completed through the bath of metal in the main furnace chamber.

The flow of current through the secondary channel, which is of restricted cross section, generates heat and at the same time forces the heated metal vigorously into the furnace chamber above. In this way cold metal fed into the bath through the furnace ports comes into contact with freshly superheated metal while colder metal flows downward into the superheating zone. Again we have electromechanical action which not only transfers heat but also thoroughly mixes the metals in the alloy.

The low-frequency or vertical ring induction furnace, as it is sometimes called, is perhaps the most fool-proof of all brass-melting furnaces with respect to metal quality. If the metal charged is right, it is an easy matter to produce uniformly good molten metal without any great need for skill from the operator. Skill is required in the installation of the lining, but during its life there is little need for maintenance and little necessity for skilled mechanical or electrical repairs. Spare furnace shells, ready for operation should be ready to replace a furnace at the end of its refractory life, since renewing the worn-out refractory is a time-consuming job.

During actual melting the efficiency of the low-frequency furnace is high but this advantage is partly lost through the fact that a partial flow of electric current is necessary at all times, including nights, Sundays and holidays, to maintain enough molten metal for a continuous fluid secondary circuit. The furnace is usually started by first preheating the channel with a gas or oil flame and then pouring in enough metal, melted elsewhere to fill the channel and form a completed secondary circuit.

Although the distance between primary coil and secondary circuit is not quite so critical as in the high-frequency furnace, it is important, and the coil has to be air cooled by means of a blower. Also, the refractory wall surrounding the channel must be thin and at the same time proof against leakage of fluid metal. Many users of this furnace prefer to form the secondary block by ramming a plastic refractory, but pre-formed, pre-fired blocks are available from refractory manufacturers. In any case, the cylindrical wall of the main chamber is formed by ramming.

Modifications of the basic type described here have been designed for aluminum melting and are

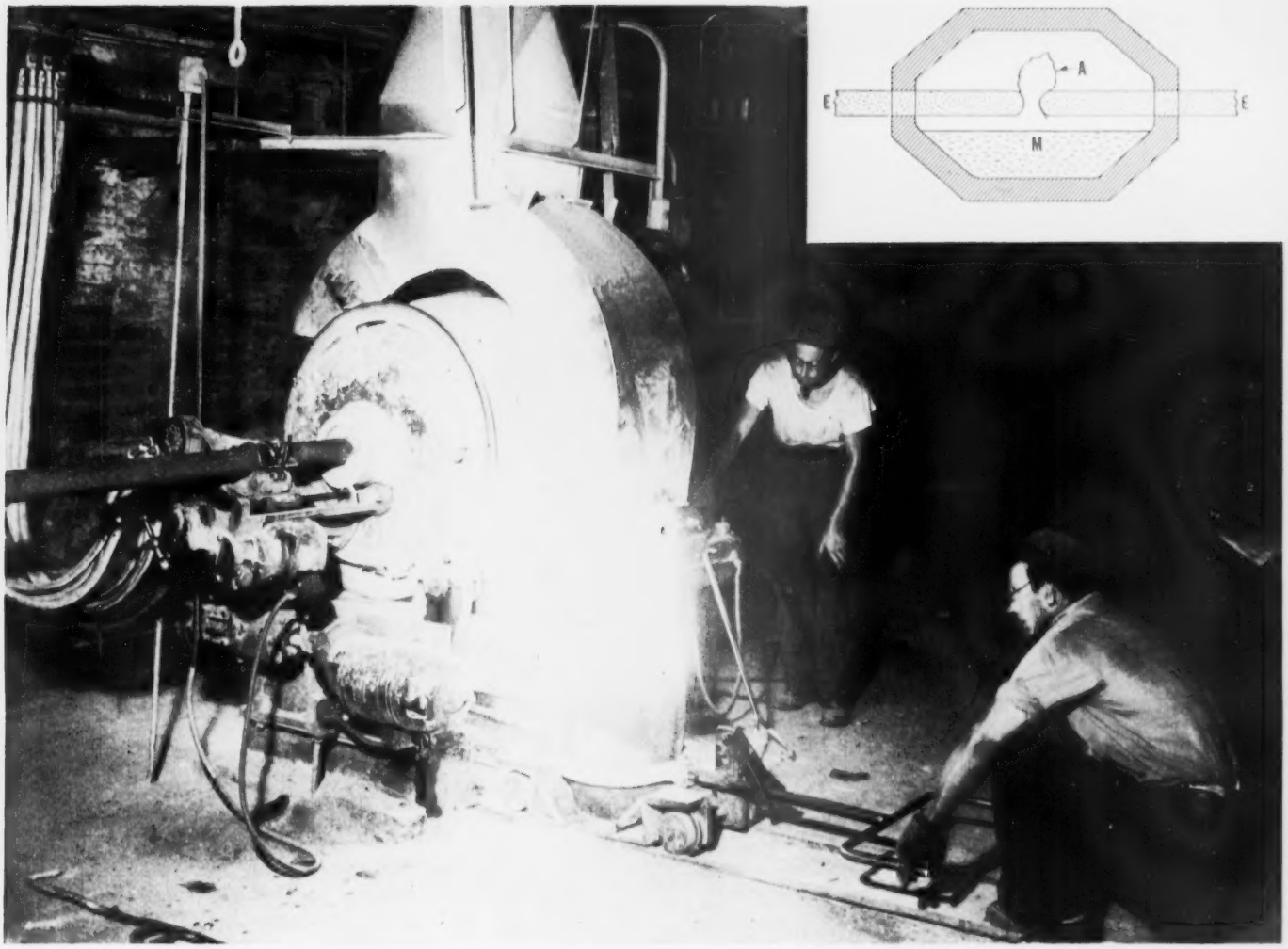


Photo courtesy of Detroit Electric Furnace Division, Kuhlman Electric Co.

Fig. 5—The indirect-arc rocking furnace is another commonly used type of electric melting furnace. In the diagram which appears at the top right, A is the electric arc, EE the graphite electrodes and M the metal

in successful use. These also seem promising for brass foundry use, particularly in connection with the possible automatic pouring of molds.

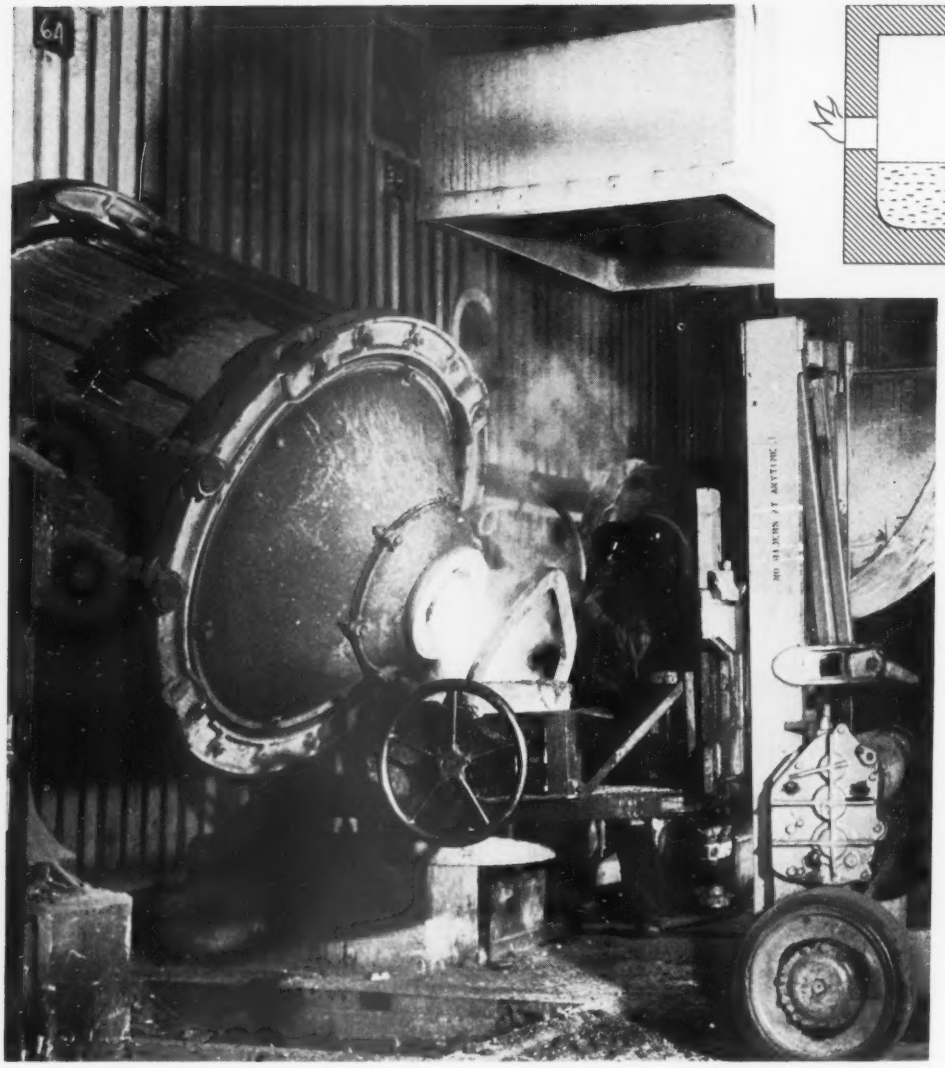
All furnaces of this type are nearly ideal from the standpoint of working conditions—no noise and not much heat. They lack flexibility because they must be completely emptied and started fresh when it is desired to change alloys.

Indirect-arc Furnace—Another commonly used type of electric furnace is the indirect-arc rocking furnace diagrammed in Fig. 5. A barrel-shaped melting chamber with conical ends rests on power-driven rollers which rock the barrel backward and forward to tumble the metal during melting and mix the molten metal during superheating. The source of heat is an electric arc between horizontal graphite electrodes above the melt. The metal also absorbs heat as it washes over the heated brickwork during rocking. The electric arc is controlled by motor-driven electrode contollers while the rocking mechanism automatically increases the angle of rock during the melting cycle. Charging the furnace from a dump bucket is a fast, mechanized operation, and the pouring of metal into a ladle is controlled by pushbutton.

With so much mechanism involved, there is need for highly-skilled mechanical and electrical maintenance. Installation of the refractory lining and its maintenance thereafter also require more than ordinary skill.

The indirect-arc furnace is a melting machine, very fast and efficient, expensive to install, economical to operate provided all of the needed skills are available. Change of alloy is not troublesome if the change is not too radical. The lining will pick up lead from a leaded alloy, and this must be guarded against if such an alloy is to be followed by one having a low-lead maximum. For extreme changes it is common practice to have spare shells ready so that a new one can be installed for the new alloy. This is not too troublesome if it doesn't have to be done frequently. Metal of top quality can be produced consistently provided a number of important precautions are observed. Working conditions are excellent except for the noise of the electric arc, which may occasionally be objectionable.

Open-Flame Furnace—A popular furnace for both jobbing and production foundries is the open-flame furnace, in which a gas or oil flame im-



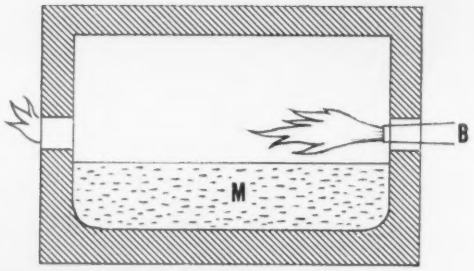


Fig. 6—The open-flame furnace is popular in both jobbing and production foundries. It tilts to pour and some mix metal by rocking or rotating. In diagram above, B is the oil or gas burner and M is the molten metal

Photo courtesy of National Bearing Division

pinges directly upon the metal. These are made in a number of shapes and sizes. Most of them tilt to pour and some of them mix the metal by rocking or rotating. A typical design is shown diagrammatically in Fig. 6. A measure of judgment and experience are needed in the melting operation in order to obtain maximum efficiency and metal quality. At best, metal losses from volatilization and oxidation are appreciable. Both heat and noise are adverse factors in working conditions. However, furnaces of this type are fast, efficient melters and hold an important place in the industry. The investment cost is moderate.

Reverberatory Furnace—A recent modification of the open-flame furnace, which may truly be classed as a reverberatory, is shown in Fig. 7. In this design molten metal ready for super heat lies in a shallow pool on the furnace hearth but the actual melting takes place in a sort of stack or cupola above the hearth. A gas or oil flame enters at one end of the furnace, passes over the hearth and then upward through the metal packed in the cupola melting zone. Some of the zinc vaporized from the hearth pool is condensed when it reaches the melting zone so that the zinc loss is not so high as might be expected. However, a considerable measure of oxidation is unavoidable. Melting is fast and efficient, the investment cost moderate. Refractory maintenance of the hearth roof is somewhat of a problem but otherwise maintenance costs are not excessive. Working conditions are reasonably good.

A special design of cupola, similar to that used in iron foundries but on a smaller scale, has found some acceptance, principally for melting high-lead bearing alloys. Alternate layers of coke and metal are charged at the top of the cupola, metal tapped at the bottom. An exceptionally pure grade of coke, such as petroleum coke, is used, and if such a fuel is employed, a good quality of metal is obtained. Metal losses are unavoidably on the high side. There can be no substantial change of alloy during a run and the metal cannot be held waiting for molds. There is no possibility of temperature control other than to make sure that the metal is hot enough. Since the melt is in direct contact with the fuel, melting is rapid and efficient.

Selecting the Fuel—Let us see if we can clarify a rather complicated situation. First of all, what about a choice of fuels? Electricity is the most

convenient since it comes into the foundry through wires with no problem of storage or disposal of combustion residues. Gas is piped in almost as simply. Oil must be stored and replenished but the storage problem is not a difficult one. Solid fuels are troublesome to store and must be transported from storage to furnace. There are ashes to handle and get rid of, and these need to be processed for recovery of metal before disposition.

If electricity is used, there is the demand charge to consider. Once a maximum use of current has been established there usually ensues a minimum monthly charge for a period of one year, even in months when there may be no use whatever of electricity. There should be a thorough understanding with the power company regarding this and other matters pertaining to the use of electricity before deciding to install electric furnaces. If it is found that the cost of electric energy will exceed 2 cents per kw hr, the advisability of electric melting will depend upon its other advantages since the fuel cost will be high. If gas is to be used, there needs to be assurance that fuel will be available at normal pressure during the coldest weather likely to be encountered.

If we picture a plant where small quantities of several different alloys are required every day, the convenience of the lift-coil induction furnace would be strongly in its favor, assuming that the high investment cost could be absorbed in the melting cost over a period of ten years or so. If, at the other extreme, we have a foundry which melts one alloy in quantity, day after day, 24 hours per day, the low-frequency induction furnace could be used.

Investment Cost May Be Factor

If the rate of production is modest and low investment cost is of prime importance it would be natural to select fuel-fired crucible lift-out furnaces, at least until such time as production increased and more capital became available. For larger production, tilting crucible furnaces or direct-flame furnaces would be a logical choice, particularly if the local cost of electric current is high or electric service conditions unfavorable. If conditions are favorable for electric melting, capital is available and it is desired to attain the lowest possible operating cost, electric furnaces, either induction or indirect-arc, might well be the choice.

All electric furnaces have the advantage of operating with a stagnant atmosphere, free from combustion gases. If need be, molten metal can be held almost indefinitely without fear of deterioration. Metal losses by volatilization and oxidation are very low, less than one-half of 1 per cent when melting the red alloys. Even when all losses are considered—including pouring, grinding, blasting and pickling—it is possible to operate an electric foundry at an annual net loss of less than 2 per cent, based on the total weight of metal melted.

The indirect-arc furnace is perhaps the most versatile of the high-efficiency furnaces. It is suitable for use with any nonferrous alloy and can also be used for stainless steel or iron if such a need

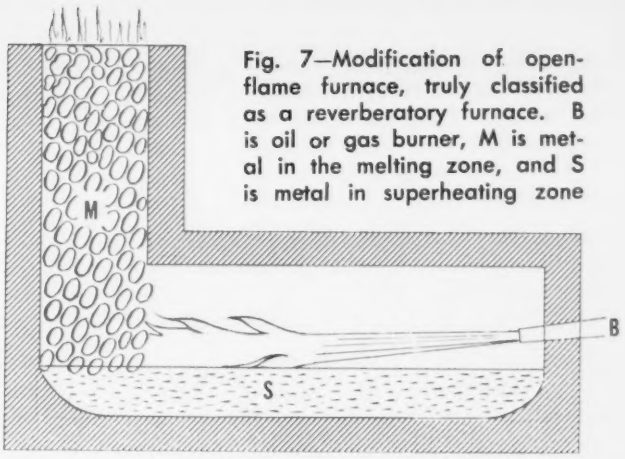


Fig. 7—Modification of open-flame furnace, truly classified as a reverberatory furnace. B is oil or gas burner, M is metal in the melting zone, and S is metal in superheating zone

should occasionally arise. It is well adapted to automation and will handle any type of dry charge from 100 per cent turnings to 100 per cent ingot. If a large quantity of metal is needed for an exceptional pour, these furnaces can be operated at double their rated holding capacity by adding to the charge as melting proceeds. On the other hand, if the foundry production consists largely of alloys containing 20 per cent or more of zinc, the more gentle action of the low-frequency induction furnace gives it an advantage.

It should be emphasized that the foundryman needs to consider with great care the types of skill he requires for the furnace he selects. Many a fine furnace installation has failed to perform as expected because operating precautions were not observed or because the foundry lacked maintenance men of the ability needed to keep the furnaces in good operating condition.

If it is expected that foundry requirements for molten metal will vary widely during the course of a year, it would seem good sense to limit the installation of costly high-efficiency furnaces to meet not more than the average monthly requirement. It is probably better to meet peak requirements with low-cost furnaces, even though their operating costs are somewhat high, than to have expensive equipment stand idle for considerable periods of time.

In choosing the size of furnace to be installed, it is well to consider what size crucible or ladle is to be used and the number of pouring crews. The crucible or ladle size should be no larger than can be poured into a line of molds before undue cooling takes place. The capacity of a tilting-crucible or hearth-type furnace should be such that the furnace can be emptied quickly and put back to work at its melting job. For example, if there are to be three pouring crews using 250-lb ladles, a 750-lb furnace would be right; if only two pouring crews, a 500-lb furnace would be more suitable. Most foundries making a variety of work need furnaces of several sizes.

No matter what type of furnace is to be employed there are definite precautions to be observed if best results are to be obtained. These differ greatly from one furnace type to another and will be discussed in the next article, which will be devoted to melting practices.

SIEVE MESH	PER CENT ON		PER CENT ON		PER CENT ON
70	1.08		0.03		27.40
100	21.26		3.20		57.80
140	63.60		53.00		12.60
200	9.54		36.30		0.80
270	4.50		7.30		1.30
FINENESS	101.3		121.0		70.7

ZIRCON SANDS

Fig. 1—Screen content of zircon sand represents this wide range

Fig. 2—Graph illustrates zircon sand as is and with 10 to 100 per cent of zircon flour added to it

Use of Zircon Sand

in Producing Large Castings

How zircon sand can be used to advantage in reducing metal penetration of sand is discussed here. This paper was presented before the 1954 Technical and Operating Conference of the Steel Founders' Society of America

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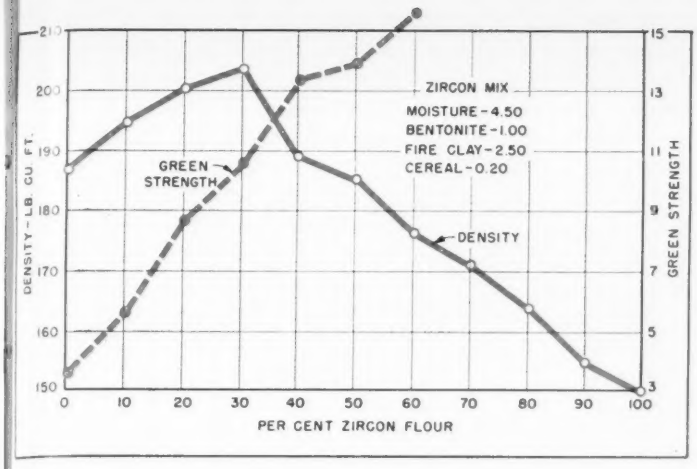
ZIRCON sand has become a valuable aid to steel foundrymen producing quality steel castings. Although this sand has been available since the early 30's, it really has come to the fore in the last few years, probably because the price has gone down. Also, the supply is more abundant, and foundrymen have been on the alert for a better molding medium than silica sand.

The steel foundryman's problem has been to avoid penetration of cores surrounded by a heavy section of metal, or, in large castings, to avoid roughening the surface nearest the gate because of all the metal passing over it. Pockets in castings become severely penetrated because of excessive heat when sand is surrounded by metal. When a 36-in. head is used on a casting, the bottom part of the head, in the fillet area, becomes penetrated because of the excessive heat. This sand must be removed before the burner can remove the head.

Zircon sand may be the answer to the above problems.

Supplies Appear Ample—The principal sources of this sand are Australia and Florida. Known placer deposits in Florida, California, Idaho and Oregon are estimated to contain 15 million tons of zircon. These reserves could be increased substantially if the demand for zircon warranted intensive exploratory campaigns. In addition, zircon reserves are known to be extensive in Egypt and in French West Africa. The supply, then, is not short.

An estimated 10,000 tons of zircon was consumed by the refractory industry in England in 1952. Consumption of zircon in the United States in 1952 is estimated to have been 40,000 tons. The



largest use was in the manufacture of refractories; foundry facings was second.

Zircon is being stockpiled by our government in quantities which are not available for publication. Japan also is stockpiling zircon, which it is receiving from Australia.

Zircon sand is not mined principally for itself, but is a byproduct of rutile and ilmenite. It is mined along the beach and dredged up from 50 ft below ground level. The specific gravity of zircon, 4.7, enables it to be concentrated with other heavy minerals by gravity methods. Clean zircon is produced from heavy mineral concentrates by a combination of drying, screening, oil flotation, electrostatic and electro-magnetic processes.

The analysis of zircon includes the following percentages: Minimum zircon content, 99.00; maximum TiO_2 content, 0.25; maximum Fe_2O_3content, 0.10; maximum quartz content, 0.50; and maximum miscellaneous content, 0.15. The melting point of zircon is 4000° F. The zircon content analyzes on the oxide basis to 65.0 to 66.5 per cent ZrO_2 and 33.5 to 35.0 per cent SiO_2. Color of zircon sand varies—light brown, gray, pale yellow, green and reddish brown.

As Fig. 1 indicates, the screen content of zircon sand represents a wide range. Below are typical screenings as we received them. The third screening, with an AFS fineness of 70.7 was rejected, but some foundries use this sand. This screening is given to show one cannot accept zircon sand at face value; the screenings should be checked for each shipment received.

Sieve Mesh	% On	% On	% On
70	1.08	0.03	27.40
100	21.26	3.20	57.80
140	63.60	53.00	12.60
200	9.54	36.30	.80
270	4.50	7.30	1.30
Fineness	101.3	121.0	70.7

Cost a Factor—Zircon sand costs five times as much as silica sand and, because of its fineness, is not recovered from the sand system after original use. Since the specific gravity of zircon is 4.7 and that of silica sand is 2.65, the foundryman must use 80 per cent more zircon than silica sand by weight to cover the same area. Therefore the foundry using zircon sand must feel the results justify using this high-cost material.

The most important value of zircon sand seems to be its ability to produce castings without "burning in" or sand or core penetration. This advantage naturally is particularly important in heavy castings.

The cost of removing burnt-on sand or of removing a core with terrific penetration is worth the price of zircon sand. Although burnt-on sand does not always affect the working part of the casting, it is impossible to evaluate the harm caused by a casting when the surfaces have poor eye appeal. Pride in the work produced by a foundry is not measured by dollars and cents.

Zircon sand should be used sparingly. In making a large core, line the face with zircon about 1 in. thick and back it up with silica sand. Wherever it is used, do not apply the sand too thickly. It is just as effective if rammed 1 in. thick.

Zircon sand has several properties which enable the foundryman to produce castings without penetration or burning-in, and all contribute to its effectiveness. They include:

High Conductivity—Conductivity is about twice that of silica sand.

High Refractory Value—The melting point is 4000° F, in the pure state. With the binders that the foundryman adds to his sand, the fusion point becomes 3400° F. Silica sand in the pure state melts at 3300° F and with additives in the neighborhood of 2850°. This high fusion point definitely is a favorable property of zircon but is not all-important.

One authority on sands states that sand should have a sintering point within 200° of the pouring temperature. A foundryman who operates a high-alloy steel foundry recently stated that the high sintering point of zircon gives him better surfaces on castings than when he uses silica sand. The pros and cons of this subject are extensive. Interested persons should read the sections on sintering on pages 405 and 435 in Charles W. Briggs' book *The Metallurgy of Steel Castings.*

Expansion Qualities—Zircon sand expands one-third as much as silica sand. This excellent property tends to prevent scabbing, which may occur when a large amount of silica flour is used in silica sand, particularly if it is not dried enough and if the core is in storage too long.

Chilling Properties — The chilling properties of zircon sand are excellent, but naturally not as effective with steel as with aluminum, magnesium or gray iron, in which they may eliminate the need to use a head when zircon sand is used in a particular spot.

Zircon sand is approximately 20 per cent more effective in chilling than silica sand. A steel chill, however, is a little over three times as effective as zircon, and graphite is just a little less than that. Although zircon sand is moldable, in steel it is not drastic enough for effective chilling. There are, however, places where a little chilling is necessary,

and zircon sand meets such a requirement.

Chemical Stability—Zircon sand is more stable chemically than silica sand, not so apt to enter into any chemical reaction with iron or iron oxide at the temperature encountered at the interface. The author formed this opinion during experiments conducted in the last few years in trying to understand better why penetration occurs.

Weight of zircon sand is 180 lb per cubic foot That of silica sand is 100 lb per cubic foot. The higher weight per given volume has been stated to be an important property in combating penetration. This point of view is subject to question.

When we speak of silica sand as being made more "dense" by the addition of silica flour, we mean that we fill in the voids and therefore lower the permeability of the sand, making the sand more resistant to metal penetration. We do the same thing to zircon sand when it is filled with zircon flour.

Therefore, if we start out with silica sand and zircon sand of the same fineness, it will take the same volume of flour to close the voids in the two sands. Consequently, the fact that zircon sand is higher than silica sand in specific gravity does not make zircon sand any more effective than silica sand in terms of the word "density" as it is used to refer to permeability in silica sand.

Notice the graph on pounds per cubic foot in Fig. 2, illustrating zircon sand as-is and with 10 to 100 per cent flour added. The moisture is the same in all batches, 4.5 per cent. The weight per cubic foot starts at 187 lb and reaches its peak at 30 per cent flour added, which is 203 lb per cubic foot. With 40 per cent flour, it drops to 190, at 90 per cent it is 154 lb per cubic foot, and all zircon flour is 150 lb. A 400 AFS zircon flour was used in these tests. The graph illustrates that raising the amount of flour added to the sand does not continually give more weight per cubic foot.

The mix used for the above test was 20 lb of zircon sand, 1 per cent bentonite, 2½ per cent fireclay and 0.2 per cent cereal. The high moisture content, 4.5 per cent, was used only for this test because the higher the flour content added to sand, the drier or more unworkable it becomes. Ordinarily we use 2½ per cent moisture.

Notice the green strength, which increases according to the amount of flour used. The regular sand has a green compression strength of 3.6, and at 50 per cent flour addition it is 13.9.

It has been stated that zircon sand resists being wetted by molten metal. I do not know how this information has been arrived at or what tests have been employed. Tests have shown that poured steel does not act any differently when poured on zircon sand than when poured on silica sand. Open molds were poured flat and also tilted. Metal was poured from a spoon, and from a visual observation there was no difference. The patterns or flow of metal seemed identical.

The fineness of the zircon sand used, usually 100 to 140 AFS, naturally will tend to promote a smooth, sharply detailed finish. There is no doubt in my mind that this sand must be used only in critical spots because of its high cost and because the low permeability of such sand makes it difficult for gas to be released from a mold.

Sand Formulas — There are many zircon sand

Fig. 3—After lab tests are completed, a 2-in. core is placed in center of a bottom-gated 30-in. diam head. Time required to remove the core is observed, and hole is inspected for cleanliness

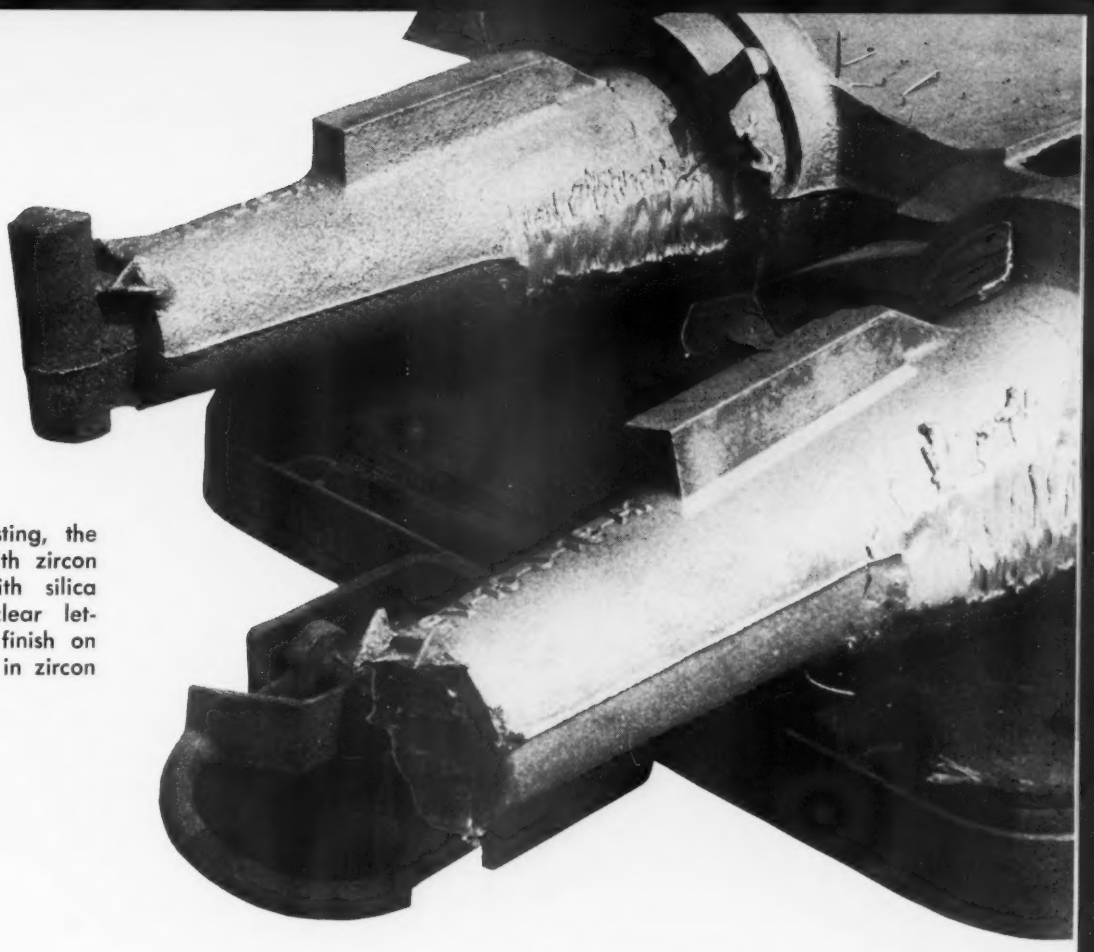


Fig. 4—In one casting, the shaft was made with zircon sand, in other with silica sand. Note the clear lettering and smooth finish on the casting made in zircon

formulas. These are a few of the more popular ones: Zircon sand, 100 lb; western bentonite, 2.25 per cent; corn flour, 0.50 per cent, and water, 3.00 per cent.

For green sand molding: Zircon sand, 100 lb; western bentonite, 1.50 per cent; and water, 1.50 per cent.

Zircon sand for high hot strength: Zircon sand, 100 lb; bentonite, 1.00 per cent; fire clay, 2.50 per cent; cereal, 0.20 per cent; and moisture, 3.00 per cent.

The third formula is for our all-purpose zircon sand. We have used a few other formulas with oil and finally decided on this mix after laboratory tests and actual experience. We discontinued other zircon sand mixes with oil formulas and now use the one formula for all purposes.

A laboratory test was made to determine whether prolonged baking periods would reduce the amount of penetration as determined by the pin penetration test, using the dilatometer. A test also was made to see if exposure to the foundry atmosphere for a period of a few days would have any influence on the amount of penetration with this sand. The samples also were tested for hot strength at 2500° F.

Samples were made and baked at 400° F for 4, 8, 12 and 20 hours and allowed to cool to room temperature in a desiccator. Half of the cooled samples from each baking time were taken from the desiccator and placed in the foundry for three days. The remaining samples were taken to the dilatometer and tested for variations in hot strength.

The hot-strength tests at 2500° F, 8-minute soaking period, for samples tested when taken from the desiccator showed constant value of 12 psi for the four different baking periods.

Results of the tests on samples exposed to the atmosphere for three days were identical. Therefore the conclusion reached is that this exposure has no effect on the hot strength of the sand.

The penetration test at 2500° F with a 12-minute soaking period, showed 14.5 to 15.5 per cent penetration on samples taken from desiccator and 13.7 to 14.3 per cent on samples exposed to the atmosphere for three days. These tests indicated the sand would not be harmed by the exposure.

The sand tested was zircon with 3 per cent bentonite, 3 per cent fireclay and 3 per cent moisture.

At one time we used a zircon sand formula with 3 per cent bentonite and 3 per cent fireclay. Using Dietert's penetration pin test, we found that the sand gave us 15 per cent penetration. When we changed the formula to 1 per cent bentonite and 2½ per cent fireclay with 0.2 per cent cereal, penetration was reduced to 11 per cent.

The properties of this zircon sand are: Moisture, 3.0 per cent; green compression, 5.0; permeability, 33; flowability, 91, and dry compression, 325.

Hot strength and expansion varied with temperature as follows: At 500° F, 155 and 0.0010; at 1000°, 270 and 0.0019; at 1500°, over 1000 and 0.0030; at 2000°, over 1000 and 0.0060.

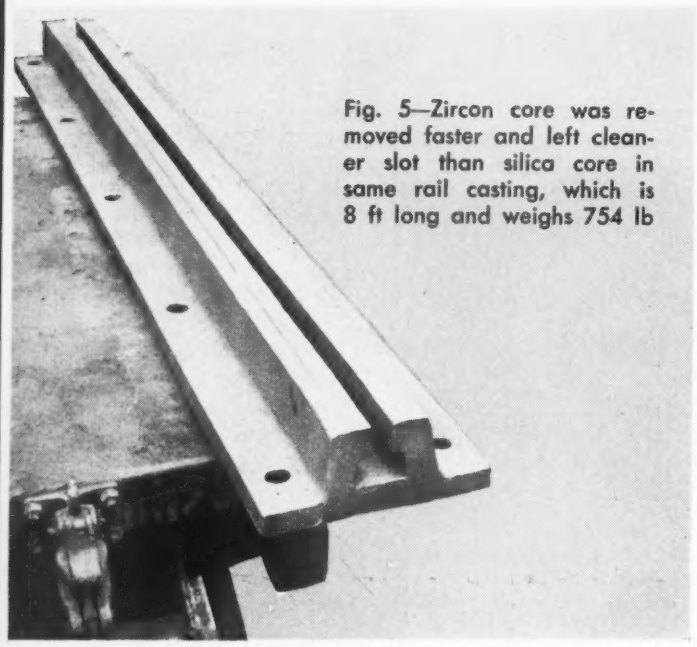


Fig. 5—Zircon core was removed faster and left cleaner slot than silica core in same rail casting, which is 8 ft long and weighs 754 lb

Graphite Additions—Recently we conducted some tests on the addition of graphite in our zircon mix, using additions of 2, 4, 6, 8 and 10 per cent. The 2 per cent indicated burnt-on sand on the pin, the 4 per cent indicated 2.5 per cent penetration, and the 6, 8 and 10 per cent indicated 1.8 per cent penetration. Since the melting point of graphite is 6500° F, it certainly seems that zircon sand with 6 per cent graphite added would aid in reducing penetration in a severe test. The extra cost of graphite certainly would make it impractical to use under normal conditions. I have been informed by one foundry that the addition of graphite has decreased penetration.

After our laboratory tests are complete, we take a 30-in.-diam head (Fig. 3), place a 2-in.-diam core in the center of the head, bottom gate, observe the time it takes to remove the core and inspect the cleanliness of the hole.

In our opinion, the penetration pin test is most valuable in making sure the sand mix does have the property of resisting penetration.

The penetration pin test consists of preparing sand or core test specimens with a ¼-in.-diam and a 1½-in.-long hole in the center. This is accomplished by placing the penetration test pattern on the top of the stripping post to form a hole in the rammed test specimen. A metal pin of the composition desired is placed in the hole in the specimen. This specimen then is placed in a furnace at 2500° F, held for 12 minutes, removed and allowed to cool. The loss in weight of the pin is expressed in percentage and designated as penetration.

Here is shown the difference to which the additives affect the green compression strength in two sands—one zircon, the other silica.
The additives used are 3 per cent bentonite and 3 per cent fire clay.

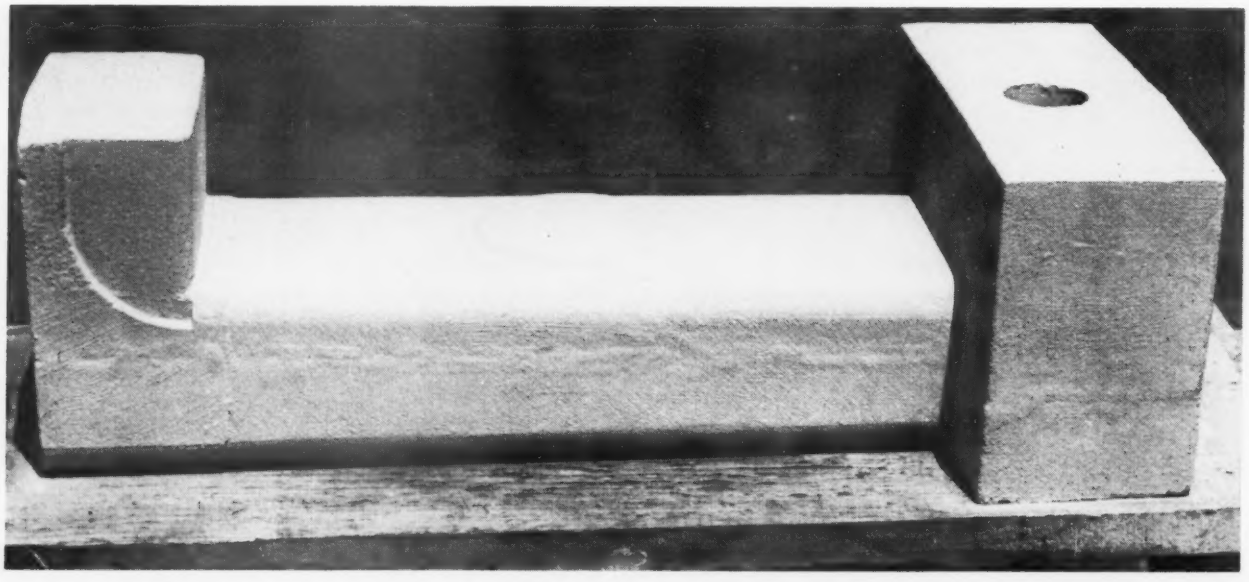
Zircon Sand		Silica Sand	
Moisture	3.9	Moisture	4.2
Permeability	21	Permeability	190
Green compression	7.1	Green compression	4.0
Flowability	88	Flowability	86.5
Density	179	Density	100
AFS fineness	121	AFS fineness	50

One can see readily the greater efficiency of bond material in zircon sand. No doubt the fineness of sand has a great effect.

Choice of the right additives is important since the beneficial effect of zircon sand can be lost with the wrong additives. The penetration pin test can be a great help in choosing the right additives to reduce penetration.

Sometimes we are prone to condemn the sand

Fig. 6—Slot core for a 2400-lb casting was made with remarkable success in zircon sand, without chills. It is 5 x 8½ in. and has over-all length of 32 in.



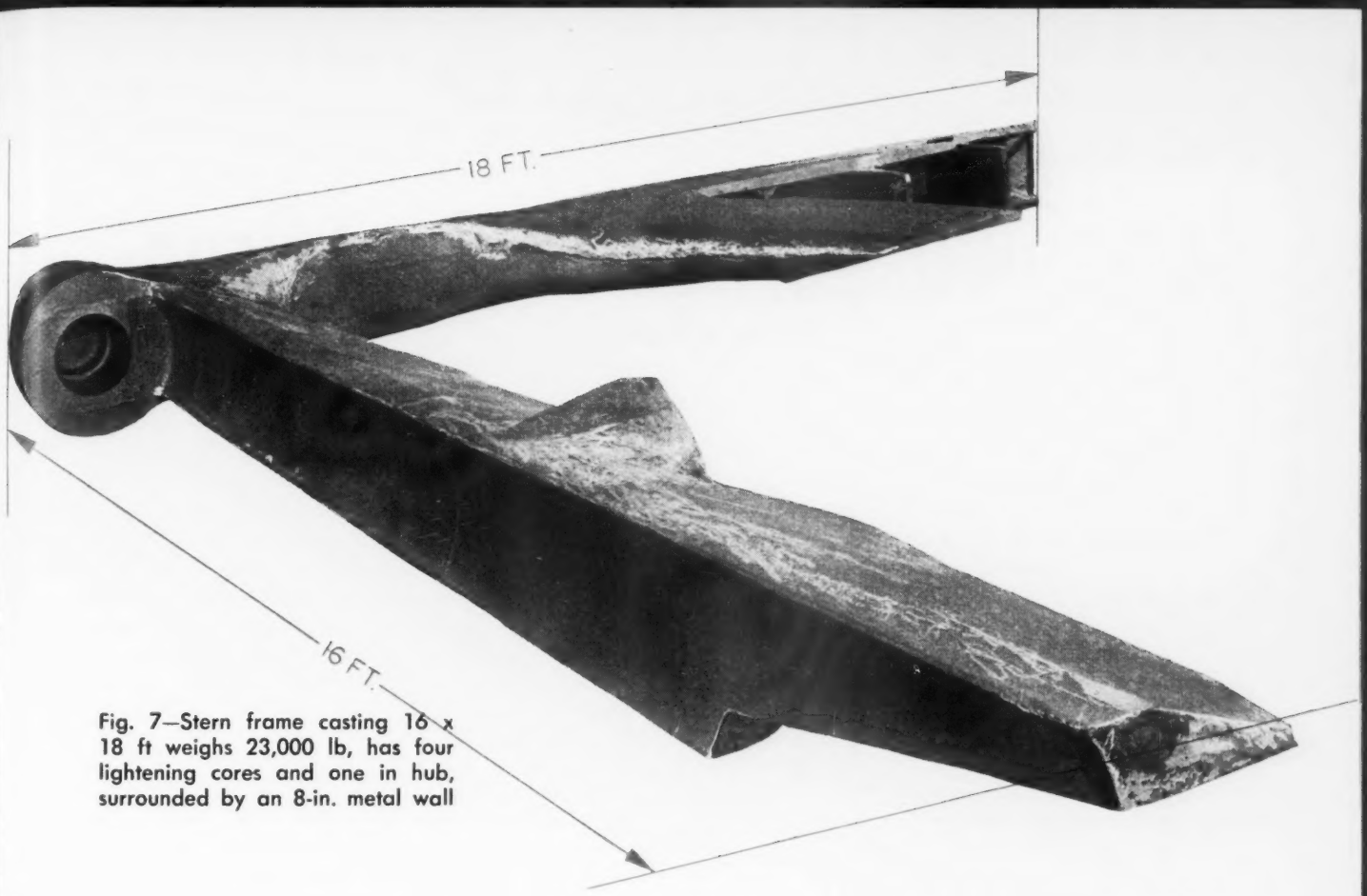


Fig. 7—Stern frame casting 16 x 18 ft weighs 23,000 lb, has four lightening cores and one in hub, surrounded by an 8-in. metal wall

when the trouble really lies in what we add to the sand, how we ram the molds, how we dry them and how long the mold is closed before pouring—as well as how many core rods we have in the core. I believe that if we performed the above mentioned functions properly, we would have better results with a poor grade of sand than if we performed them improperly with a good grade of sand.

Typical Castings—Fig. 4 illustrates two castings. It should be obvious which was made with zircon sand. Notice the clear lettering and smooth finish. Zircon sand was used only on the shaft of this casting; the casting was gated at the end shown, poured uphill, then reversed. It weighs 800 lb.

Fig. 5 shows a rail casting 8 ft long which weighs 754 lb. The slot core was made with zircon sand and was removed during shot blasting. Previously, a silica sand mix had been tried. Time consumed in removing the core was excessive, and the slot was not nearly as clean as when zircon sand was used. Zircon sand is more easily removed from castings during shakeout than silica sand.

Fig. 6 shows a slot core for a 2400-lb casting. It is 5 x 8½ in. with an over-all length of 32 in. The drag portion was made of baked zircon sand. This core was hollowed out after baking and backed up with silica sand. Then the cope core was made of zircon sand, hollowed out, backed up with silica sand and topped with green sand to the drag core. This core is made by another foundry which employs eight chills in corners of the core to counteract cracks. We have not used any chills and have had remarkable success by using zircon sand. However, in my opinion, the green-topped core is the most powerful aid available to the foundryman in releasing resistance to cracking.

Fig. 7 shows a stern frame 16 x 18 ft which weighs 23,000 lb. This casting has five cores, four lightening and one in the hub, surrounded by an 8-in. metal wall. These holes were cleaned by shot blasting.

Summary — Advantages of zircon sand: High conductivity, high refractoriness, low expansion, good chilling effect and better chemical stability. Disadvantages of zircon sand: Higher cost, usually no recovery and the possibility of inferior zircon sand in which grains are contaminated with oil.

A simple test will evaluate the percentage of grains contaminated by oil when the sand is received. Use a beaker of distilled water and let grains slide from your hand into the water. Observe what amount remains on the surface. If the proportion is too great, these grains will not take the bonding material, and your sand batches will have varying green strength, which affects other properties. I never have tested a sand entirely free from this contamination. Do not become unduly alarmed, however, for a small amount of oil-contaminated sand will not affect casting quality. I have used zircon for some time, and it is only recently that I have tested for oil contamination. During the period the sand was not tested, the results usually were satisfactory.

Zircon sand is a definite aid in the production of quality steel castings, despite the high cost. It will reduce penetration and burn-in, gives a smooth finish and produces castings with good eye appeal.

Colorimetric Determination of Combined Carbon in Cast Iron

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THE IMPORTANCE of the combined carbon estimation is often overlooked in cast iron laboratories where the normal elements—total carbon, silicon, sulphur, phosphorus, and manganese—are regularly determined. However, combined carbon is not to be ignored because, in one determination, it gives a greater indication of the type of structure to be expected than does any other single determination.

This fact is recognized by most makers of chilled iron car wheels, ingot molds and high-strength irons, but it is overlooked in the majority of general purpose and engineering iron foundries. It is overlooked not so much because it is not understood that combined carbon bears a relationship to the quantity of pearlite present, but more because of the inaccuracy of one method of determination and the inconvenience of another.

Two Methods—There are at present two main methods for making the determination. The first involves the gravimetric determination of total and graphitic carbon and obtaining the combined by difference. The second is a direct method wherein a nitric acid solution of the sample is compared with one of a similar standard iron, and adjustments are made until the two solutions appear to the eye to be of the same shade of color. The first method is accepted as being the more accurate, but it has the disadvantage of being very time consuming, while the second has nothing to commend it other than speed because its accuracy commonly is open to considerable question.

The need for a method combining the accuracy of the gravimetric method and the convenience of the colorimetric has long been evident, and the use of a photoelectric colorimeter seemed indicated.

After some preliminary work based on the existing colorimetric method, it was found that rate of solution and final dilution of the sample were the two main factors affecting accuracy. On the basis of this information, work was carried out on the use of mixed acids and various sample sizes, and a method was finally arrived at which gave a straight-line relationship within the range normally expected in gray iron. This method has been in use in the author's laboratory since October, 1953, and has also been adopted by other laboratories in the Canada Iron Group. It is felt that sufficient experience has been gained in its use to justify publishing the results of this work.

How It Is Done—The method consists essentially of dissolving the sample in a mixed acid, filtering, diluting, and measuring the light transmitted by the solution in a Fisher Electrophotometer.

Mixed Acid: To 500 ml distilled water add 100 ml concentrated sulphuric acid. Cool, and add 50 ml concentrated orthophosphoric acid (88 per cent H_3PO_4) followed by 350 ml nitric acid.

Procedure: Transfer 0.8g of the sample to a 125-

Fig. 1—Working graph, showing combined carbon in gray iron based on values given in Table II

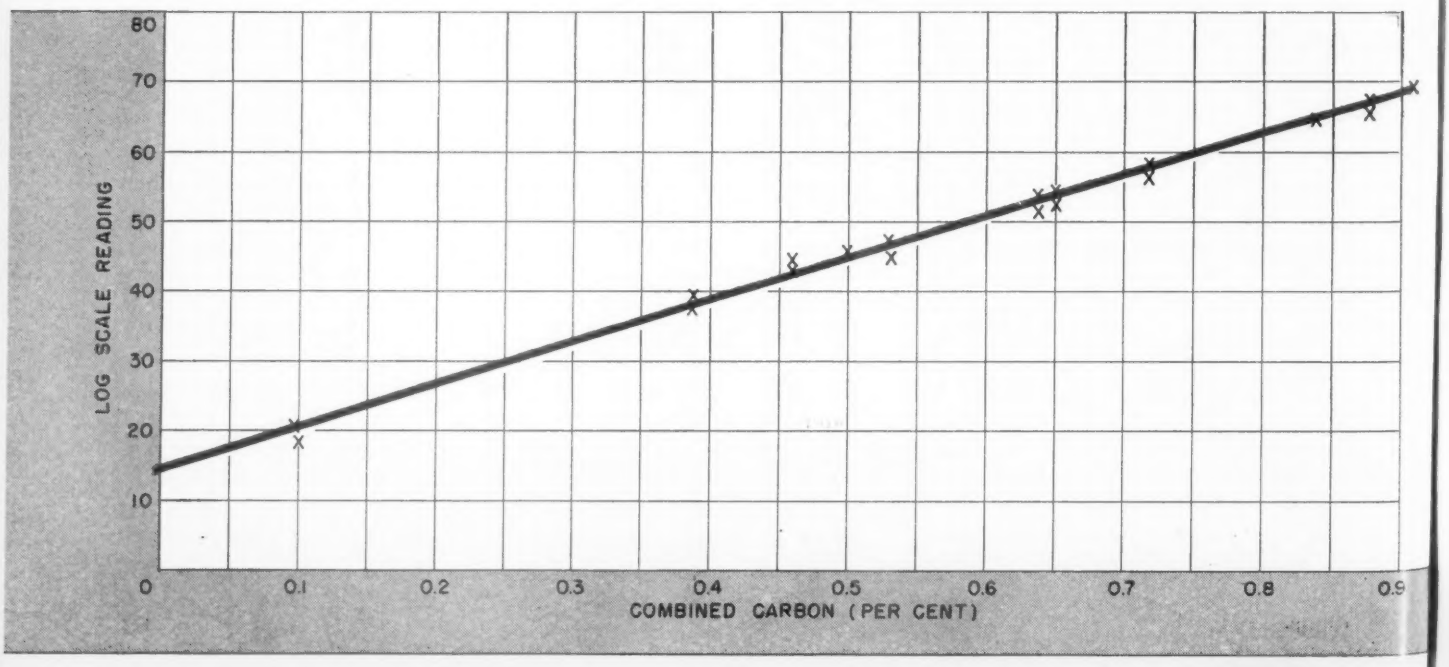


TABLE I—Irons Used In Calibration

Description of Sample	TC	CC	GC	Si	S	P	Mn	Cu	Ni	Cr	Mo
Bureau of Standards cast iron (car wheel) 122c	3.06	.72	2.34	0.64	.115	.29	.55	.050	.024	.033	.003
Bureau of Standards cast iron Ni-Cr-Mo 107a	2.72	.88	1.84	1.35	.095	.278	.582	.103	.968	.479	.771
Bureau of Standards cast iron Ni-Cr 82a	2.24	.53	1.71	2.07	.102	.053	.649	.076	1.07	.323	.008
Bureau of Standards cast iron 4h	2.44	.65	1.79	1.34	.070	.124	.84	.242	.065	.117	.017
Bureau of Standards cast iron 5J	2.37	.46	1.91	2.44	.100	.241	.70	.99	.018	.021	.005
Bureau of Standards cast iron 7E	2.92	.39	2.53	1.88	.079	.878	.448	.022	.011	.015	.003
Ingot mold iron Sample No. 62	3.66	.64	3.02	1.34	.068	.113	.96	...	...	...	...
Chilled iron car wheel Sample No. 67	3.40	.84	2.56	0.64	.080	.225	.71	...	...	...	...
Chilled iron car wheel Sample No. 130	3.43	.93	2.50	0.63	.125	.218	.66	...	...	...	...
Chilled iron car wheel Sample No. 139	3.36	.64	2.72	0.58	.116	.316	.70	...	...	...	...
Annealed cast iron pipe Sample No. 127	3.50	.10	3.40	2.15	.154	.404	.58	...	...	...	...
General purpose soft iron Sample No. 99	3.51	.55	2.96	2.24	.094	.356	.61	...	...	...	...

ml Erlenmyer flask and add 25 ml of the mixed acid. Place flask in a 600-ml beaker half full of boiling water and keep boiling until all action has ceased. When only a small trace of action is left, remove the flask frequently, swirl the contents and replace in beaker if action is not yet complete. As soon as the sample has been completely dissolved, remove the flask and cool rapidly in a water bath. Filter through Whatman 41H paper into a 100-ml volumetric flask and wash Erlenmyer and filter paper with cold distilled water, care being taken to use a large number of very small washes. Dilute to the mark and mix thoroughly.

Transfer approximately 20 ml to the cylindrical absorption cell of a Fisher Electrophotometer and measure the light transmitted, using distilled water in the reference cell, blue filter number 425, and light intensity setting "B." Using the reading obtained, the combined carbon content of the sample is then taken from a graph or calculated from the calibration equation.

Calibration—In order that possible effects of other elements on the determination be explored, calibration was carried out using widely different irons. The reference in each case was either the certified value of combined carbon on a U.S. Bureau of Standards sample, or a determination by the gravimetric or difference method of the ASTM. The irons used are listed in Table I, the alloy contents of the production irons not being determined but low in amount. The values obtained by the method being described are given in Table II and a working graph is given in Fig. 1.

TABLE II—Carbon Values Obtained

Sample	Log Scale Reading	Combined Carbon % By Difference	Combined Carbon % From Equation	Error %
107a	67.0	0.88	0.88	Nil
122c	58.0	0.72	0.73	+0.01
99	44.5	0.50	0.51	+0.01
4h	54.0	0.65	0.66	+0.01
62	53.5	0.64	0.66	+0.02
67	65.0	0.84	0.85	+0.01
127	20.0	0.10	0.10	Nil
130	69.0	0.93	0.91	−0.02
139	52.0	0.64	0.63	−0.01
82a	46.0	0.53	0.53	Nil
4h	52.2	0.65	0.63	−0.02
107a	66.0	0.88	0.86	−0.02
122c	57.0	0.72	0.71	−0.01
127	19.0	0.10	0.09	−0.01
82a	45.0	0.53	0.53	Nil
5J	43.0	0.46	0.48	+0.02
7E	37.8	0.39	0.40	+0.01
5J	43.5	0.46	0.49	+0.03
7E	38.6	0.39	0.41	+0.02

Mean error ± 0.01%. Maximum spread 0.05%.

The calibration covers the complete range normally associated with gray cast iron, namely 0.1 to 0.9 per cent CC.

The equation of the best line passing through the points shown in Table II and Fig. I was found to be:

$$\text{Combined Carbon (per cent)} = \frac{\text{Log Scale Reading} - 13.7}{60.7}$$

$$= (\text{Log Scale Reading} - 13.7) \times 0.0165$$

Slow Solution—An average batch of five determinations can be completed in one hour, but this time is dependent mainly on the rate of solution and can vary more or less. Occasionally samples are found which take a particularly long time to dissolve; in the case of Bureau of Standards Iron No. 82a this amounted to 40 minutes. In extreme cases such as this, the graphite may agglomerate due to the formation of silicic acid. If this happens, add 0.25 to 0.5 ml (6 to 12 drops) of hydrofluoric acid and continue heating until all action stops; otherwise the solution will not filter.

On no account should H F be added before the graphite is seen to coagulate. During calibration, the Bureau of Standards Iron No. 82a was the only sample which required the H F treatment, and extremely few others have been found during the past two years.

Filter Paper—It is necessary to standardize on the grade of filter paper used. In this calibration 41H was used as it gave the best all-around filtering speed, but if determinations are being made on highly oxidized irons, such as are found on the inside surface of ingot molds after they have been in use for some time, it will be found that a closer grade of paper is required. This will affect the calibration, and for cases such as this it is better to check the effect of a dense paper using standard samples, or to use the difference method if this type of sample is received only occasionally.

Effect of Prolonged Heating—Colorimetric procedures are sometimes subject to errors from vari-

TABLE III—Effect of Light on CC Determination

Sample No.	Holding Time After Filtering (Mins.)					Lighting Condition	Drop in 30 Mins.		Drop in 120 Mins.	
		15	30	60	90	120		Diff.	% of Original	Diff.	% of Original
1	0.72	...	0.70	0.70	0.69	0.69	Artificial Light	0.02	2.8	0.03	4.2
2	0.82	0.80	0.77	0.76	...	0.72	Bright Sun Light	0.05	6.1	0.10	12.2
3	0.50	0.48	0.48	0.47	...	0.44	Bright Sun Light	0.02	4.0	0.06	12.0
4	0.75	0.75	0.74	0.74	...	0.74	Dark Cupboard	0.01	1.3	0.01	1.3
5	0.66	0.66	0.65	0.65	...	0.65	Dark Cupboard	0.01	1.5	0.01	1.5

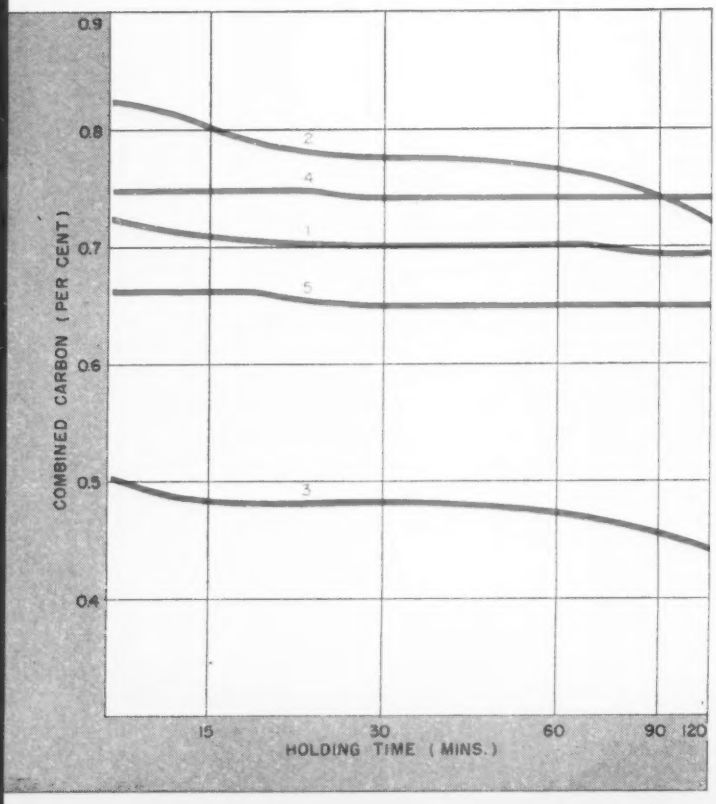
ations in dissolving or heating schedules, and also from fading of color on standing after development of color. These two effects were investigated for the method being described.

Five samples of a standard iron were weighed out and placed in beakers of boiling water to dissolve. When the reaction was almost complete (i.e. only one spot of action visible) the first flask was removed and placed in the cooling bath. The second was cooled as soon as all action had stopped, and the others at intervals of 2, 5 and 10 minutes from this time.

The first four filtered normally but the last one was so slow that under normal circumstances it would not have been continued. In any case only a very careless operator would allow the sample to continue heating more than five minutes after the completion of solution. From the results it can be seen that within normal limits there is no loss in accuracy, and grossly prolonged heating would be indicated by slow filtering.

	Time	Scale Reading	Calculated CC %
1. Reaction almost complete	9.16	51.5	0.62
2. Reaction complete	9.19	50.0	0.60
3. Two minutes after reaction complete	9.21	51.0	0.62
4. Five minutes after reaction complete	9.24	50.0	0.60
5. Ten minutes after reaction complete	9.29	48.5	0.57

Fig. 2—Effects of light on CC determination



Effect of Prolonged Standing After Cooling—Five samples were dissolved and the first cooled rapidly under the cold water tap and filtered immediately. The other four were placed in the cooling bath at 15° C and removed at intervals of 15, 30, 60 and 120 minutes. The combined carbon was measured in each as soon as it was filtered.

	Scale Reading	Calculated CC %
Quench immediately in cold water	57.5	0.72
15 minutes in bath at 15° C	56.0	0.70
30 minutes in bath at 15° C	57.0	0.71
1 hour in bath at 15° C	55.0	0.68
2 hours in bath at 15° C	55.0	0.68

The solution for the first test was left in the absorption cell exposed to a room temperature of 76° F (24° C) and artificial light, and a reading taken every half hour.

	Scale Reading	Calculated CC %
First reading	57.5	0.72
½ hour standing	56.0	0.70
1 hour standing	56.0	0.70
1½ hours standing	55.5	0.69
2 hours standing	55.5	0.69

These results showed that the sample could be allowed to stand for up to half an hour before filtering, and a further hour after filtering without any appreciable deterioration in color taking place. However, the laboratory in which this test was carried out has only artificial lighting and in order that this question be explored more fully, some solutions were taken to a room receiving strong sunlight and others were placed in a dark cupboard. Table III and Fig. 2 show the results of these tests. It can be seen that exposure to strong sunlight causes the most rapid loss of color, particularly at high values of combined carbon.

For greatest freedom of error due to deterioration of color it is, therefore, preferable to carry out this determination under artificial lighting conditions or shielded from direct sunlight.

It is also apparent that if measurements with the electrophotometer cannot be made immediately after filtering, no serious loss in color will result if diluted solutions are put in a dark cupboard.

Conclusions—The method described for determining the combined carbon content of cast iron colorimetrically is rapid and apparently not too sensitive to operating variables. On the evidence presented and the record to date the method is reproducible and of acceptable accuracy, and although regular checks are made against the standard ASTM gravimetric method, no unexplained discrepancies have developed.

The author would like to express his appreciation to the management of Canada Iron Foundries Ltd., for permission to publish this paper.

Fig. 1—Squeezer machine molding is performed along one wall, which supplies abundant light

Close Control Pays Off in

ALUMINUM FOUNDRY OPERATIONS

By EDWIN BREMER
Metallurgical Editor

ALMOST from its beginning in a modest way in 1946, Solon Foundry Inc., Solon, O., realized that careful control of the various operations involved in its production of aluminum alloy castings would pay big dividends. As a result of that policy the firm has enjoyed a continual growth, and today is melting about 20,000 lb per day of a variety of alloys. The firm specializes in castings for the aircraft field and pressure-tight applications, but manufactures other types also.

Occupying a floor space of about 40,000 sq ft, the foundry is arranged as indicated in the accompanying sketch. Molding, melting and cleaning departments are located in one section. Coremaking, finishing and heat treatment departments are in an adjoining one, while pattern storage, core ovens, laboratory and abrasive blasting equipment are in a third section.

Molding department is about 60 ft wide and 80 ft long. Eight squeezer type molding machines are located along the outside wall. Majority of the molds are set out on the floor by the molders, and jackets and weights are placed by separate crews who shake out the molds on the floor after pouring and then temper and prepare the sand by shoveling it into a sand conditioning unit. Each pair of machines has a sand conditioning unit. Opposite side of the molding department is devoted mainly to floor or hand molding, but is equipped with a jolt-rollover molding machine. Two con-

Fig. 2—Aluminum alloys are melted in oil-fired furnaces arranged along two walls of the room

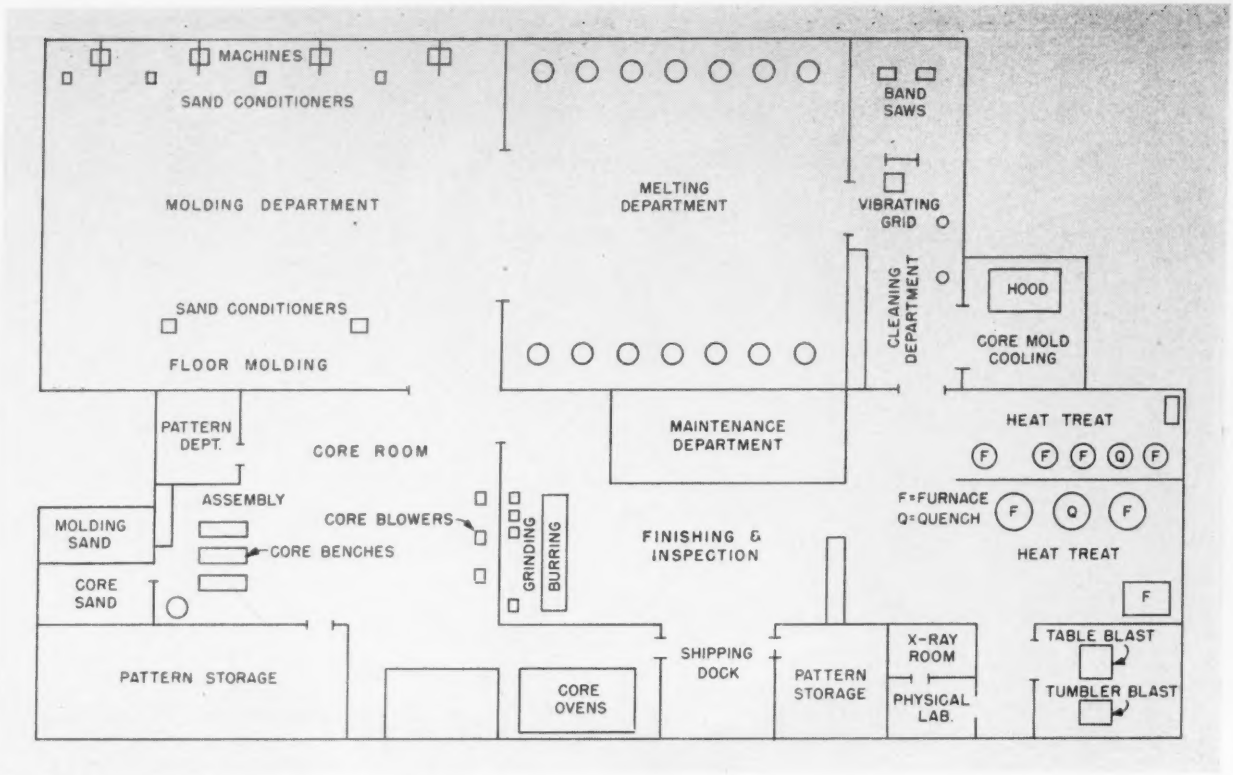


Fig. 3—Floor plan sketch of the foundry showing where the departments and equipment are located. Floor area is approximately 40,000 square feet

Fig. 4—After the cores are made they are placed on racks which then are moved into the ovens on hand-operated lift trucks. Ovens are oil fired

ditioners are available for preparing the sand. Sand used is No. 0 Albany. Castings produced weigh from 4 oz up to 300 lb and average about 15 lb.

One of the squeezer floors is devoted strictly to experimental or pilot work. Operations are conducted in co-operation with the pattern and x-ray departments. All patterns coming into the foundry are sent to the pattern department where members of the supervisory staff determine the gating and risering to be employed. After the pattern department does the required work, the pattern goes to the experimental floor where one or more pilot castings are made. These are cleaned and sent to the physical laboratory where critical areas are x-rayed and/or sectioned to determine their soundness. If castings are sound, the pattern equipment is released to the foundry for production. If they are not, pattern changes and new pilot castings are made until the required soundness is obtained.

Melting department is about 60 x 60 ft and is equipped with 14 oil-fired furnaces arranged in two rows of seven each along the walls. They are stationary type with the tops about 3 ft above the floor level, and hold graphite crucibles of 500 lb capacity. Metal is dipped out in hand ladles and

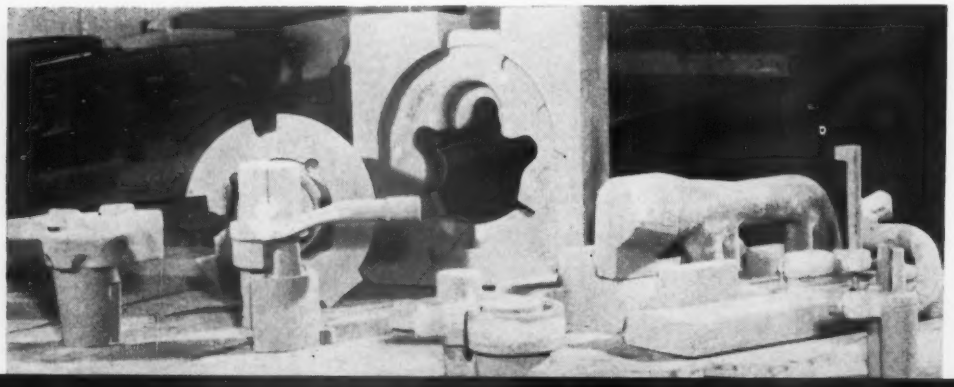


Fig. 5—Cores for castings are made in a wide range of shapes, and thicknesses vary from ⅛-in. on upward to several inches. Dimensions are accurate

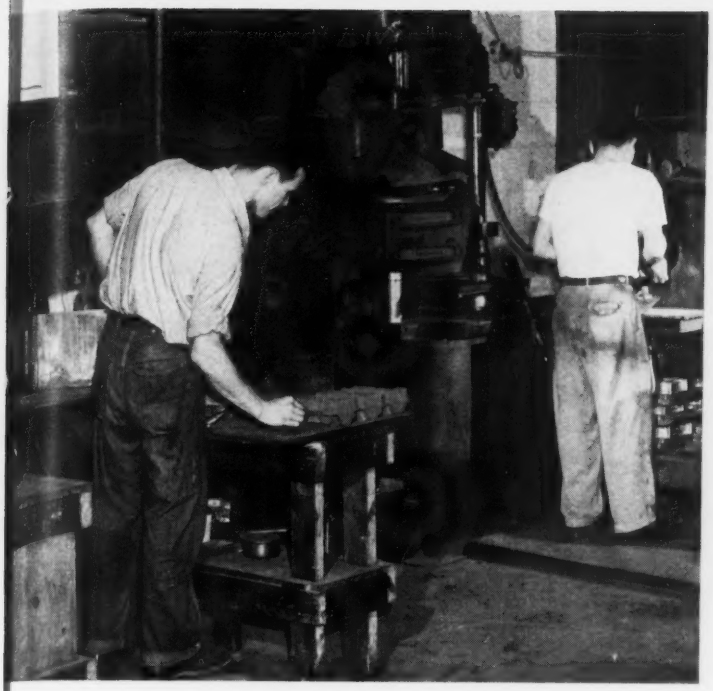


Fig. 6—Certain types of cores which are adaptable to the method are produced on core blowers

Fig. 7—Liquid resin is added gradually to the dry sand as it is mixed in the mulling machine

carried to the mold set-out floors for pouring.

Test for Porosity—To insure that the aluminum alloy is free from porosity after a dry flux treatment, a small disk about 3 in. in diam and 1 in. thick is made in a core sand mold. As soon as it cools to handling temperature it is taken to a lathe in an adjoining room, and a thin cut made across the face just sufficient to get under the surface skin. The cut is made with a fine tool to provide a very smooth machined surface, which is examined carefully for any evidence of porosity. If it is free of porosity the metal is released for pouring, otherwise it is given another flux treatment followed by the test. Before the metal is dipped out and poured, temperature is taken with a pyrometer to make sure that it is within the desired range.

Coremaking operations are carried on in an area about 40 x 100 ft. Cores are made by hand on the bench and on five coreblowing machines. Cores made include a wide variety of shapes and sizes, ranging from small ones with sections $\frac{1}{8}$-in. square or round to large core molds with 4 or 5 in. sections. Some idea of the range of cores made may be gained from the accompanying illustrations, one of which shows all the cores and the core molds for making a 6-cylinder, water-jacketed engine designed for a light-weight application.

Since the majority of the castings produced by Solon Foundry must meet close dimensional tolerances and have smooth surfaces inside and out, the cores must be made accordingly. Aluminum alloys have low heat capacity as well as low specific density, and cores must be formulated to accommodate those characteristics so that they may not only be removed from the castings easily but also not cause blowholes.

A certain amount of heat is required to disintegrate or burn out the binding agent sufficiently so that the cores can be removed. Low heat capacity of the alloys requires holding the binder to the minimum; preferably the binder should disintegrate at as low a temperature as possible. Low specific density in the liquid state means that the alloys are easily penetrated by gases under relatively low pressure. Therefore, the cores must possess good permeability to carry away any gases generated and preferably be formed of materials low in gas content.

Use Liquid Resin Binder—With these factors in mind the firm, like many progressive foundries, reviews its coremaking practices from time to time to ascertain whether any improvements can be

Fig. 8—This view clearly shows the complete setup for an experimental cylinder block including core molds and water jacket and barrel cores

Fig. 9—At the upper left the operator is setting a core barrel in place. Fig. 10—Illustration above shows closing core mold. Fig. 11—At left operators are filling the mold. Fig. 12—Bottom view shows how the mold breaks from casting

made. Experiments are made by varying the baking time and temperature, the amount of binding agents and the different types of binders as they become available. Over a year ago the company began some experimental work with a new acrylic type resin in liquid form which seemed to offer some interesting possibilities. After a period of time, suitable formulations were developed which met requirements of low gas content, ease of removal from castings, stability on storage, non-critical baking range, maintenance of size tolerances and sharp edges, etc. For the past six months all cores and core molds used in the foundry have been made with this binder. As a check on size and shape tolerances, the baked cores from time to time are replaced in the coreboxes and examined for "fit".

Two types of sand are used. Where particularly smooth surfaces are required, a low-clay bank of 180 AFS grain fineness is used. Other cores and core molds are made of silica sand of 55 AFS grain fineness. Fine sand formulation is 300 lb sand, 10 lb of the resin binder mixed with 0.25 per cent graphite and 1 lb water. Silica sand mix is composed of 300 lb sand, 1¼ lb southern bentonite and 10 lb resin plus graphite. No cereal is used since the mixes possess sufficient green strength to prevent sagging or sloughing.

Sands are mixed in a muller. Sands are dry and are measured in a steel hopper which holds 300 lb when struck off level at the top. Batches are mixed for 1¼ minutes and then taken in wheelbarrows to any of the six benches and five coreblowing machines. Cores are placed on racks and baked in either of two oil-fired recirculating type ovens at 450° F. Time of baking will depend upon section thickness, but is not critical. Those up to 1½ in. are baked for one hour and thicker ones are baked

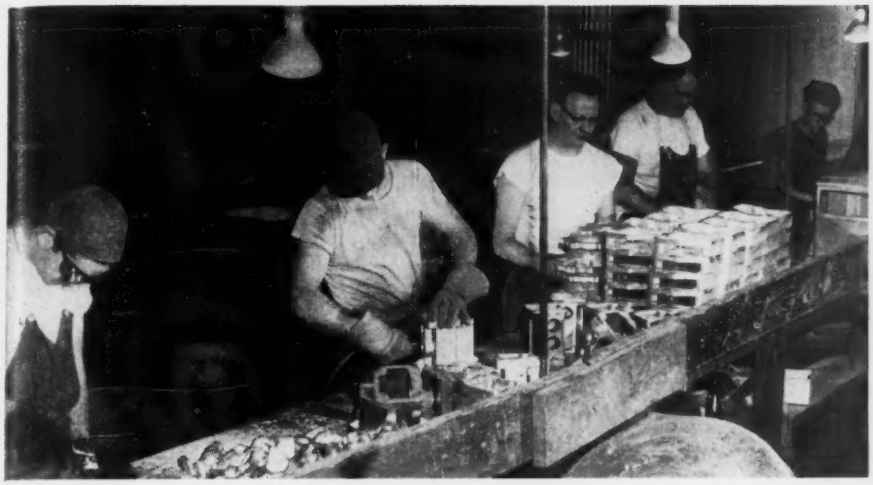


Fig. 13—One of the finishing operations used on the castings is burring with rotary tools

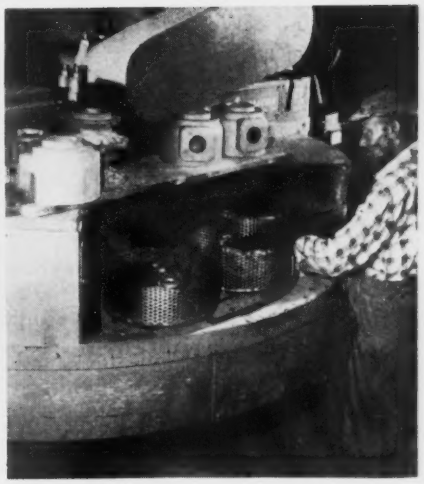


Fig. 14—Castings are cleaned by shot blasting in either a rotating table or a tumbling unit

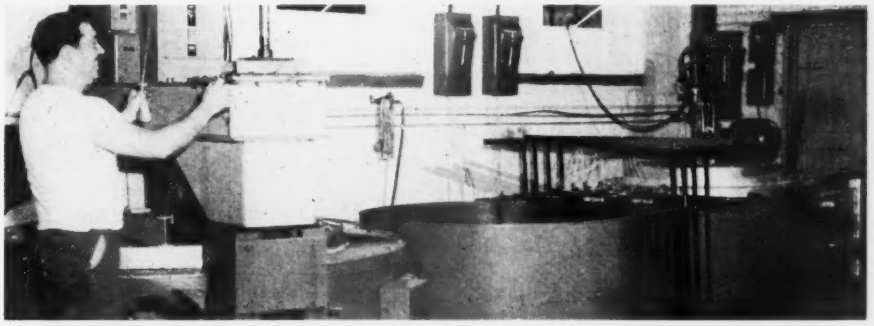


Fig. 15—One section of the heat treating department showing two of the large furnaces with quenching tank

for two hours. Core molds with much heavier sections are baked two and a half hours. While the usual practice is to load cores of approximately the same section thickness on the racks and bake accordingly, no difficulty from overbaking or burning has been encountered when it has been necessary to bake mixed section sizes at the same time.

After the castings are shaken out of the molding floors, they are transported in wheelbarrows to the cleaning department where any adhering sand and the cores are knocked out on anvil-type machines equipped with pneumatic hammers. Gates and risers are removed on either of two band saws in an adjoining room. Cleaned castings are transported in steel barrels to the finishing department where gate and riser stubs are ground off on three 2-wheel stand grinders, a 2-wheel horizontal axis disc grinder or on two belt grinders. Additional finishing is done with rotary burring tools. Castings also may be finished by abrasive blasting with zinc shot in either a tumbling-type or rotating table-type unit.

Core molds are assembled in the coremaking department and taken to the furnace or melting department where they are poured. After the metal solidifies the molds are transported to the cleaning department where they are allowed to cool under a ventilated hood. They are shaken out by hand or on a vibrating grid, and then are handled the same as those made in green sand molds.

Many Castings Heat Treated—Many of the castings produced by Solon Foundry, especially those for the aircraft industry, are made of heat-treatable aluminum alloys. For this work, the foundry maintains an exceptionally well equipped heat treating department. Having established itself as an approved organization for heat treatment of aluminum alloys by meeting exacting requirements of the U.S. Air Force, the firm also does considerable contract heat treating for other firms.

Heat treating department is divided into two sections. One section, 20 x 40 ft, is equipped with four pit-type furnaces and a quenching tank. One of the furnaces is gas-fired and the others are electrically heated. Capacities of the furnaces range from 75 to 2000 lb. The other section, 30 x 40 ft, contains two electrically heated pit-type furnaces with capacities of 2000 and 6000 lb, a quench tank, and a 6 x 6 x 10 ft, rectangular, electrically heated aging furnace having a capacity of 8000 lb.

Physical testing department occupies an area about 20 x 30 ft and includes the x-ray equipment and accompanying dark room for film development. Machines for tensile and compressive strength determinations and for brinell hardness are available. X-ray equipment is rated at 140 kva. In addition to being used for inspection purposes where radiographic inspection of castings is specified, the x-ray equipment, mentioned earlier, is employed for establishing proper gating and risering systems to obtain sound castings.

Questions and Answers

Troubles encountered in machining aluminum probably are caused by tools which are not finished properly . . . Reclaiming metal from aluminum dross needs equipment and experience . . . High lead alloy . . . Plaster mold information . . . Heat resistant boxes for annealing . . . Bronze coloring . . . Metal molds

Machining of Aluminum Alloys

QUESTION We are making aluminum alloy castings for a customer who has them machined in different shops. Some, but not all, are complaining about the alloy sticking to the tools and coming off stringy and are blaming the foundry for defective material.

ANSWER Proper machining of aluminum requires that the tools be keenly sharp, extremely smooth and free from imperfections. All surfaces over which the chips pass should be finish lapped or hand stoned to a high finish with the finish in the direction that the chips pass over the surface. Any roughness in the area permits the chips to cling, and the heat and pressure of cutting will cause welding of chips to tool. It is our opinion that since only part of the machining firms complain, the difficulty is due to lack of attention to tool condition, not to the castings. Details relative to machining of aluminum can be obtained in booklets available from the large aluminum producers.

Recovering Metal From Dross

QUESTION Can you give us any information on recovering aluminum from dross skimmings? In our area we believe we can obtain sufficient material, and since aluminum is in short supply, we thought that we could use the aluminum recovered from skimmings to bolster our supply.

ANSWER It is our opinion that recovery of aluminum and its alloys from skimmings had best be left to smelters having the equipment and knowledge of handling this material. In the first place, the skimmings from the average foundry may contain only from 30 to 40 per cent metallic aluminum. In many cases the material also will contain scrapings from iron-pot melting and holding units which, in addition to being high in iron content, also are lower in aluminum content.

Additionally, the skimming area and the cans in which the skimmings are placed seem to be handy places in which to dump floor sweepings, remains of lunches, glass and paper containers, etc. Also, if the skimmings are left exposed to rain and weathering, the metallic content is reduced.

Metallic material is the only part of the dross recoverable by melting or smelting. The remainder, chiefly oxides, possibly might be sold to producers of aluminum salts. Usual procedure is to grind the clean skimmings in ball or hammer mills down to 20 to 40 mesh. Product from the mill is passed over magnetic pulleys to remove any iron and then screened on vibratory type screening units. Generally two sets of screens are employed, and the metallics collected from them are melted down separately because higher recovery is obtained with coarser metallics. First screen may be 8 to 10 mesh, and the second 20 to 40 mesh. Instead of passing the whole product from the mill over magnetic pulleys, as mentioned previously, that operation may be performed only on the metallics from the screening operation.

Metallics from the screens are melted down in a manner depending upon the quantities to be handled. With small amounts, crucibles or iron pots can be used, but for large-scale operations hearth or reverberatory type furnaces are employed. Preferable reduction method is to employ the liquid heel and liquid flux method. Some heavy, chunky aluminum is melted down to form a small liquid heel in the bottom of the crucible, pot or furnace, and covered with a fluxing material which will liquefy at the operating temperature. Suitable fluxes include mixtures of sodium chloride and calcium fluoride and/or cryolite in the ratio 85:15, for example. Many proprietary fluxes also are available.

In melting after the heel is formed and covered with flux, the metallics are added in small amounts and pushed through the flux cover into the molten heel. That procedure should be done thoroughly to minimize oxidation losses. Temperature of the molten heel should be watched so that it remains liquid at all times during the melting down. If it begins to turn pasty, stop feeding metallics until the bath is fluid again. Addition of metallics to the heel or bath is continued until the crucible or pot is full. Then the covering material is removed carefully to hold entrained metal to the minimum, and the metal poured into ingots. Analysis should be made so that the composition is known.

Handling a High Lead Alloy

QUESTION Can you supply us with any information on the mixing and casting of an alloy containing 57.5 per cent Cu, 38.0 per cent Pb, 2.75 per cent Ni, 1.25 per cent Sn and 0.50 per cent Te?

ANSWER We gather from your mention of mixing that the alloy will be made from the various components in ingot form. Copper and nickel, having the highest melting points, are placed in the crucible and melted down, and the others, with considerably lower melting points, then are added. Since 38 per cent lead is to be added, the addition should be made somewhat before that of the tin and tellurium. Latter preferably should be added shortly before pulling the pot. High lead alloys are poured at 1850 to 2050°F and should be as low as possible in relation to section size so that the lead will be dispersed as fine globules.

When the alloy is poured too hot, the solidification time is extended, and the lead tends to segregate. High pouring temperatures also result in lead sweat. To further aid uniform distribution of the lead, the alloy should be stirred well just before pouring by using a "pumping" action with the stirrer just sufficient to create a "rolling" action from top to bottom.

As with any copper-base alloy, the metal should be melted as rapidly as possible, with the furnace atmosphere slightly on the oxidizing side. Gas pickup will lead to segregation and bleeding. Possibly it might be wise to try the oxidation-reduction procedure as soon as the copper-nickel combination is up to temperature, and before the other materials are added. That operation consists of adding about 0.1 per cent copper oxide and stirring it

in, then deoxidizing with a small amount of phosphor copper.

High lead alloys tend to penetrate between the sand grains, and it is almost mandatory that the mold and core faces be coated with red talc or graphite to prevent that condition. If possible, gating to the casting should be through a riser so that proper feeding is assured.

Produces Castings in Plaster

QUESTION Recently we were requested to supply sample precision castings in beryllium-copper, copper and Navy G poured in plaster with a gravity feed. We have and are furnishing aluminum and brass castings but have little success with the others mentioned. We have heard that these metals are being poured in plaster and will appreciate any information on type of plaster being used, ingredients, mixing, baking and pouring temperatures.

ANSWER Since no information is given on what difficulties are being encountered in making castings from the materials mentioned by use of the plaster molding process, no suggestions as to ways and means of overcoming them can be offered. However, we suspect that it may result from other than the process itself.

For example, copper tends to absorb gases during melting, and to obtain sound castings it must be degasified before pouring. Beryllium copper tends to produce dross—similar to aluminum bronze and manganese bronze, and the gating system must be designed to prevent turbulence. In pouring, the lip of the crucible should be as close as possible to the sprue opening to eliminate air entrainment as well as turbulence.

Two types of plaster molding mediums are in general use. One is commonly referred to as metal casting plaster containing 4 parts gypsum and 1 part fibrous talc by weight. Components may be purchased separately and mixed in the dry form, or the material may be obtained already compounded. The other, known as permeable casting plaster, contains a foaming agent which permits entrainment of considerable air during the mixing operation. After being poured on the pattern the interface is smooth and free of air bubbles, but the remainder of the plaster behind that is quite porous.

With both types of plaster it is best to follow explicitly the directions of the manufacturers on mixing, because they are based on wide industry experience. Plaster molds usually are dried at temperatures from 250 to 500°F. Drying time will vary according to the consistency—the amount of water used—and the section thickness of the mold. Essential point is that the molds be fully dried. Best procedure is to determine dryness by use of an electrical conductivity type meter with probes located in the center of the thickest portion, or by inserting a thermocouple in the same position. The mold usually is considered dry when the temperature reaches 220°F.

Molds should not be left in the oven too long after they are dry since they tend to calcine with resultant cracking, shrinkage and mold breakage. Also, molds should be poured as soon as possible after drying; if allowed to cool they will pick up moisture.

Pouring temperatures of metals and alloys should be as low as possible, and preferably that of heavy castings should not exceed 2000°F. Plaster is an insulating agent, and high temperatures are not necessary except in the case of thin sections, where it might reach 2300°F. Proper pouring temperatures should be determined by experiment, using a thermocouple, and once established they should be followed rigidly.

Boxes Must Be Heat Resistant

QUESTION We are considering casting in our gray iron foundry, boxes for annealing of malleable iron. Can you tell us what analysis generally is used, and if the necessary alloying agents can be added to the ladle?

ANSWER Annealing boxes for malleable iron are subject to very severe service. Resistance to oxidation and growth is the principal requirement. Since you apparently wish to make the boxes from your present gray iron mixture, it is recommended that you add at least 0.50 per cent chromium by ladle addition. More chromium also may be beneficial. Maximum amount you should use is that which will tend to produce chilled edges on the casting.

Ferrochromium used for ladle additions contains a little more than 60 per cent chromium, so you will have to add about 1 per cent of the alloy to your ladle to obtain over 0.50 per cent chromium in the iron—assuming 85 per cent efficiency.

Coloring for Bronze Plaques

QUESTION Producing as we do a number of bronze memorial plaques of various descriptions, including grave markers, we are seeking a more desirable method of oxidizing for color and at the same time protecting the tablets from discoloring through oxidation. We understand that there is a new process whereby the background color is secured by chemical means through formation of cuprous and cupric oxides. The alloy we are using contains 90 per cent copper, 6 per cent tin, 1 per cent lead and 3 per cent zinc. The castings themselves are quite satisfactory and it is our belief that with the low lead content there is some way of obtaining a satisfactory finish. We realize that this is not a foundry casting problem, but think possibly you might have some knowledge of the process.

ANSWER We do not happen to have any information on the coloring process you mention. You do not indicate what procedure you now are using to produce the background color, but assume it involves dipping into or brushing on sulphur-containing solutions which result in a brown-to-black sulphide coating on the copper-base alloy. Some time ago a solution containing 0.75-lb commercial copper nitrate and 0.25-lb zinc nitrate dissolved in 1 gallon of water was recommended to produce rapidly a patina. The objects to be colored are heated to 230 to 275°F maximum and the solution swabbed or brushed on. To protect the brightwork or high-lighted portions of the casting, a lacquer coating will be necessary.

Metal Molds for Auto Sleeves

QUESTION We will appreciate some technical information on the use of chills in sand casting at our foundry in Israel. In particular we are interested in casting piston rings and sleeves using chills so that a hard casting surface is obtained.

ANSWER Your reference to chills used in sand casting rings and sleeves is not quite clear. In the centrifugal casting of these parts a metal mold is employed to provide a long-lived container which will maintain its cylindrical form under thermal shock. It is not intended to produce a chilled or hard casting. In fact, the exact opposite is desired; the casting must have a gray fracture. This is obtained by use of mold coatings which form an insulator between mold and hot metal as well as a protection for the mold

surface, and by removing the casting from the mold as soon as it solidifies.

Some of the details involved in producing such centrifugally cast items are described in "Spinning Cylinder Sleeves at Perfect Circle" by Kenneth L. Mountain which appeared in the July issue. While relating to sleeves or liners, the same principles can be applied for manufacture of piston-ring pots from which individual rings are cut.

Liners or sleeves may be hardened after machining. The castings are heated to a suitable temperature above the critical range for the particular composition involved, then placed on metal arbors and quenched. Arbors are removed and the castings are drawn or tempered at a lower temperature to bring the casting into the desired hardness range.

If your remarks also apply to use of chills in sand molds to increase the rate of cooling of heavy sections which cannot be fed properly, or to obtain chilled surfaces on certain areas, it is difficult to make any suggestions without knowledge of the application. In general the chill should be as thick as the section involved, and of course coated with some type of refractory such as graphite, blacking, clay wash, etc., to prevent fusion.

The chill should be located so that molten metal does not flow over it for any period of time, because if it becomes hot it fails to serve its purpose. Chills seldom are placed in the cope, for they become heated by the rising metal.

Drastic action of chills sometimes is reduced by interposing a thin layer of sand between chill and the molten metal interface. An excellent discussion of the subject is contained in Longden's book *Densening and Chilling in Foundry Work.*

Standard Test Not Available

QUESTION For some time we have been producing irons for applications in which wear resistance is an important property. The question just has arisen as to whether there is a recognized index or standard basis of comparison for wear resistance. Are there data along this line we can obtain?

ANSWER Perhaps the best answer to your question on wear resistance lies in the following extract from a paper presented by the late Horace W. Gillett at a symposium on wear of metals held in 1937 by the ASTM:

"Wear resistance is not an inherent property. It cannot be determined or even discussed apart from the specific conditions of use, any more than can be machinability or corrosion resistance. Wear is the resultant of the material itself, the mating material and the operating conditions. Omission of any of the important elements in a parallelogram of forces gives a resultant of wrong length and pointing in the wrong direction. To be worth their cost, wear tests must point in the right direction.

"So let us stop bewailing the lack of a 'standard' wear test. There is no such animal, and there ought not to be. Instead let us each build wear test outfits as we need them, intelligently designed to simulate the particular service we want to improve. Our aim must be, in the classic words of Gilbert and Sullivan, 'to make the punishment fit the crime'."

As might be expected, various types of machines and equipment have been developed by investigators in an endeavor to ascertain wear under different conditions. Those, with the results obtained, have been described in the literature. Possibly a search of the literature might give information on the particular type of wear resistance you have in mind.

Iron Fuses to Metal Chills

QUESTION We make a great many small roll castings in gray iron and have been trying to do away with the dry sand cores now used. In their place we have been trying to use steel chills. However, this has not been altogether successful as the black lead coating which we use does not always work, and the chills fuse into the castings. These rolls are approximately 2 in. in diam and 2½ in. long and have a ½-in. core running through them. This is quite a chunky piece and there is quite a bit of hot metal around the chill. Is there any coating which you might suggest which would permit us to knock out the chills without trouble?

ANSWER Various chill coatings are being used successfully, including black lead or graphite which you mention. We suspect that you are not getting good adherence of the coating to the chill which results in unprotected areas to which the molten iron fuses.

Many commercially prepared chill coatings are available. A common method is to coat the chills with linseed or core oil and roll them in fine core sand, silica flour or other refractory and bake until dry. Ordinary aluminum paint is used successfully. A mixture of red lead and linseed or core oil makes a good chill coating. For economy, iron oxide pigment sometimes is substituted for the red lead. Graphite and oil, either a drying or mineral type is suitable.

Chillers which are precoated with a material that dries is less likely to pick up loose sand, etc. during molding. You should not have any trouble removing the chills from the rolls if that is done at the proper temperature. Usually, if allowed to come to room temperature, they may be tight. To prevent difficulty in removing chills one foundry a number of years ago turned to chills made of an alloy iron containing about 14 per cent nickel, 7 per cent copper and 2 per cent chromium which has a much higher thermal coefficient of expansion than gray iron.

Use Hard Iron for Farm Bells

QUESTION We are making some farm bell castings and are having difficulty in getting the castings to ring properly. We use 40 per cent pig iron with 2.25 per cent Si, 40 per cent machinery scrap and 20 per cent returns, and we plunge the castings into cold water while they are red hot. We also have added a small amount of nickel in some of the castings, but still do not get the desired effect. If you can make any suggestion for improving the tone of these bells we will appreciate it.

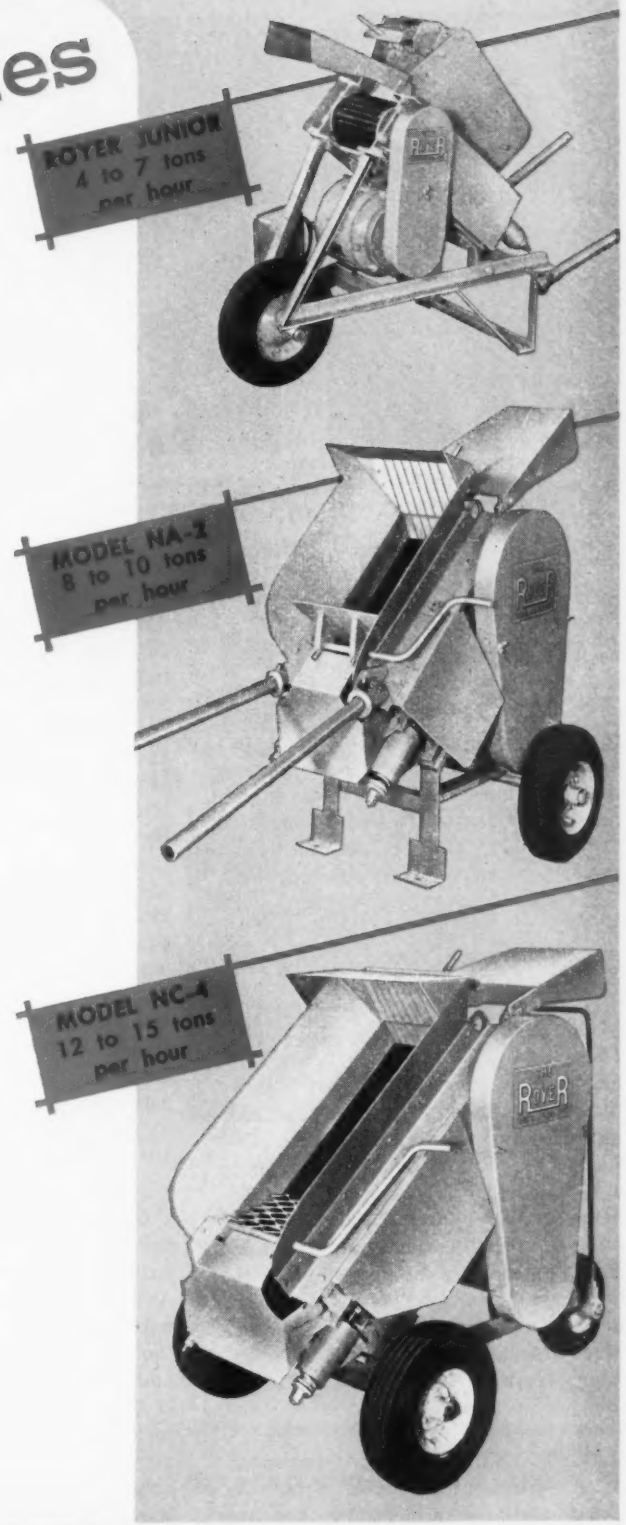
ANSWER To obtain the ringing resonant tone characteristic of bells, you will have to make changes in the iron composition to provide a structure which will not absorb or weaken vibration. In other words, you will have to employ what commonly is termed "hard" iron, or one that is considerably lower in silicon content that your present mixture will provide. For example, in a bell with a ¾-in. section the silicon content should be about 0.75 per cent, but it is advisable to do a little experimental work to determine the most suitable silicon content for the section involved, tone, etc.

Possibly you might be able to obtain the desired results by addition of sufficient quantities of chromium to the ladle—especially if the bells take only a part of the heat. Again it is advisable to experiment, and since the generally used concept of 0.75 per cent Cr offsetting the graphitizing effect of 1.0 per cent Si can be employed as a base, you might try such an addition to a ladle.

Your practice of quenching the castings is a step in the right direction, but to obtain sufficient hardening the temperature of the casting will have to be considerably higher than a red heat—probably over 1400°F—when quenched. Perhaps quenching in oil instead of water at such temperature might overcome tendency to crack.

PROPERLY PREPARED SAND

for Small Foundries Core Rooms Side Floors



There is a Royer Sand Separator and Blender to provide fast, efficient sand preparation in tonnages suitable for small foundries, core rooms and side floors in production shops. Operations having comparatively low sand requirements gain the same advantages from the use of a Royer as do larger operations without the necessity of investing in costly equipment built for greater capacities.

With the Royer specifically designed for your needs . . . regardless of the type of sand used . . . whether you pour grey iron, malleable, steel, semi-steel or non-ferrous, you will

1. Cut labor costs
2. Reduce requirements for facing sand
3. Save on costs for new sand
4. Reduce blows, drops, runouts and rough surfaces
5. Cut discount losses
6. Practically eliminate riddling time
7. Greatly reduce cleaning room costs
8. Cool your sand

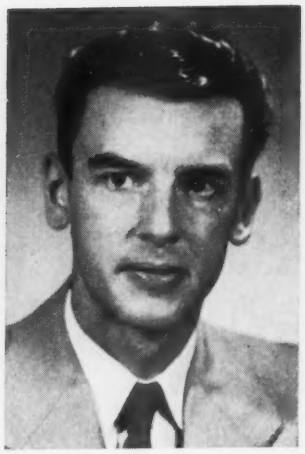
Over 8000 Royers are in use in foundries all over the world. More than one-half of the Royer users have bought additional units—certain testimonial to their profitable operation. Send for bulletin giving complete information on the sizes and models available.

Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

P. C. FUERST
. . . heads Wisconsin Chapter

THADDEUS GISZCZAK
. . . becomes factory manager



PAUL B. GUILFORD
. . . foundry metallurgist

HERBERT E. EGGERTS
. . . joins Kingwell Bros. Ltd.

P. C. FUERST, elected president of the Wisconsin Chapter of the AFS for 1955-56, is general foundry superintendent, Falk Corp., Milwaukee. Mr. Fuerst attended night courses at Milwaukee Vocational and Adult Education School and University of Wisconsin in Milwaukee. He began his apprenticeship at Falk Corp. in 1924 and held various positions, becoming general foundry superintendent in 1954. He was vice president of Wisconsin Chapter last year.

M. B. Garber and **E. C. Brekelbaum** have been elected vice presidents, Thew Shovel Co., Lorain, O. **C. B. Smythe,** president, also was elected treasurer of the company, succeeding the late H. L. Reynolds. Mr. Garber joined the company 28 years ago and recently has been director of sales. Mr. Brekelbaum, a graduate of Stanford University, joined Thew in 1952 as director of methods and in 1954 became assistant to the general manager. Previously he was vice president-executive chief engineer, Harnischfeger Corp., Milwaukee.

H. E. Steinhoff, vice president-sales, Wagner Malleable Iron Co., Decatur, Ill., was elected a company director, succeeding the late J. D. Johnson. All officers and other directors were re-elected. Directors and officers of Wagner Malleable Products Co., subsidiary, were also re-elected. **John A. Wagner** is president of both companies.

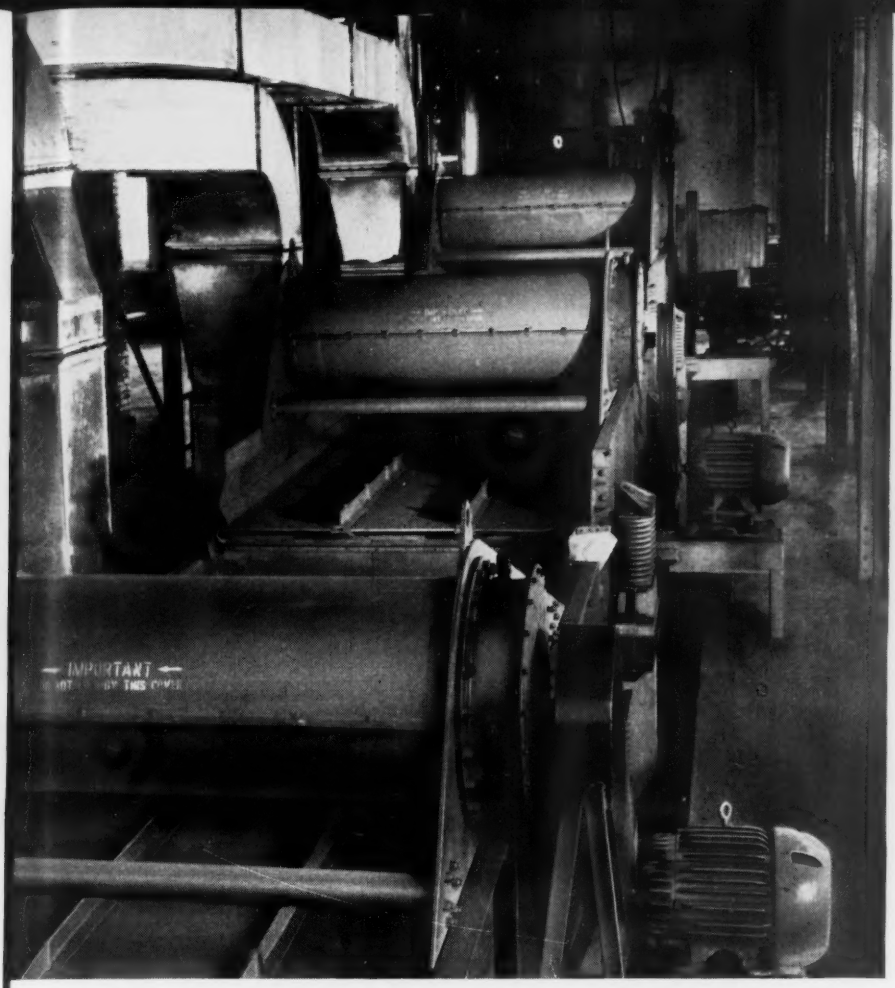
Thaddeus Giszczak was appointed factory manager, Central Foundry Division, General Motors Corp., Defiance, O., succeeding **Theodore R. Schroeder,** now at Pontiac Motor Car Division. Mr. Giszczak was graduated from Wayne University and did graduate work at University of Michigan. He was metallurgist for the Cupola Research Committee of the AFS from 1947 to 1950, when he joined Central Foundry Division. **Paul B. Guilford,** since 1951 general supervisor of the division's chemical laboratory in Defiance, has succeeded Mr. Giszczak as chief metallurgist at the plant there. A graduate of Defiance College, he joined Central Foundry Division in 1948 and after establishing a chemical laboratory in Defiance, became its supervisor in 1948.

George Gedeon has retired as superintendent of the sand foundry pattern shop, Aluminum Co. of America, Cleveland, after 36 years with the Cleveland Works. He joined the sand foundry as a layout man and later became chief inspector of L Plant. In 1925 he was named pattern shop foreman and in 1929, superintendent. **Louis Schmidt** has succeeded Mr. Gedeon as pattern shop superintendent. **Harry W. Sloane** takes over Mr. Schmidt's former duties as chief inspector, and **Anthony Polcar** has succeeded Mr. Sloane as head of the permanent mold plant's sample foundry. **Harry E. Simler,** formerly general metal and chief cost accountant, has moved to the Chicago Works as chief cost accountant. **John Wallis,** who was general foreman of the large and small sand foundries, becomes assistant superintendent of the sand foundry.

Herbert E. Eggerts has joined Kingwell Bros. Ltd., San Francisco, where he will be in charge of foundry operations and responsible for installation of the company's nonferrous foundry under construction at Richmond, Calif. Mr. Eggerts served his apprenticeship with H. C. Macaulay Foundry Co., Berkeley, Calif., and later joined Berkeley Brass Foundry, there, where until recently he was a managing partner.

Frank Kiper has been appointed president and general manager of Michigan-Standard Alloy Casting Co., Detroit, a division of Consolidated Foundries & Mfg. Corp., Chicago. He succeeds Jack Bean, who resigned. Mr. Kiper has been a vice president of the Misco Corp.-Chicago the last two years. Previously he spent 9 years with the Ohio Steel Foundry Co. as superintendent of its Springfield plant.

A. J. Fruchtl has become affiliated with W. Thomas Barr Associates, Birmingham, manufacturer's representative for foundry, heat treating, metal cleaning and finishing equipment. Mr. Fruchtl resigned recently as resident manager of the North Birmingham plant of U. S. Pipe & Foundry Co., a position he held since



HOW LYNCHBURG FOUNDRY USED PROFESSIONAL ENGINEERING TO SOLVE HIGH-VOLUME PRODUCTION PROBLEMS AT INDUSTRY'S NEWEST, MOST MODERN SHELL MOLDING PLANT

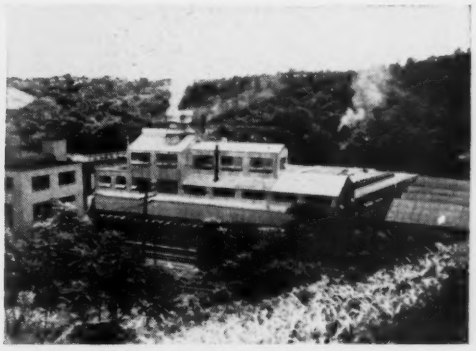
NEW FACILITIES ENGINEERED BY GIFFELS & VALLET PRODUCE 100 TONS OF FINISHED CASTINGS IN 24 HOURS!

The Lynchburg Foundry Company's new shell molding plant was built to produce large quantities of close tolerance, fine finish castings. Although shell molding is highly adaptable to mechanized operations and offers many other advantages, the planning and engineering for an installation of this size posed many new problems.

Sand is discharged from hopper bottom railroad cars, aerated, and delivered to storage silos pneumatically.

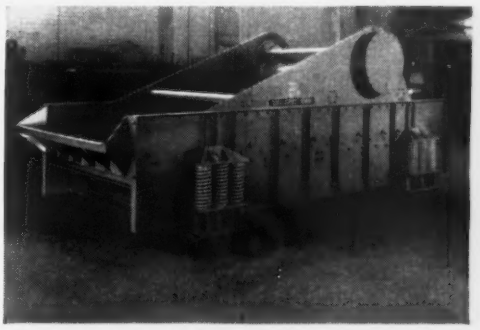
As the project progressed, the extensive facilities of both organizations were coordinated on all phases of design, engineering, equipment specification and construction. In many instances, G & V's background of experience in other industries proved of great value. Two specific examples of this were the methods used to handle the extremely fine molding sand, and the large quantities of iron shot used for shell backup.

The major sand handling problems were to control dust, prevent segregation, and introduce complete mechanization. 100 tons of dry sand with an average AFS fineness of 120 are used per 24-hour day. The sand is removed from box cars into storage silos, batched, and transported to the mullers by a completely enclosed pneumatic handling system. A specially designed cone, orifice and air slide at the base of each storage silo reverses the segregating effect of the sand entering the silo. Batches for the mullers are accurately measured by a unique electronic weighing instrument. This new sand handling system keeps dust and segregation at a minimum, and is similar to the modern mechanized methods employed in the bulk handling of cement, flour, and other dry materials.



Completed plant, looking toward the cupolas.

About 125 tons per hour of shot must be separated from the castings, then cooled and cleansed of sand. This is accomplished by a series of vibrating screens constructed of heavy-duty stainless steel cloth. Air exhausted through the screen at the rate of 150 CFM per square ft. cools the shot from above 300° to below 150°. The screen is designed so that air pull is equal at every point on its surface. Rate of travel and depth of the shot bed can be readily adjusted to meet varying requirements. All transfer points in the system are provided with a "stone box" so that the highly abrasive shot falls upon other shot, rather than abrading the chutes themselves. This method was adapted from similar applications in the cement and rock products industry.



Heavy duty vibrating screens air cool and clean the shot without the use of water.

These are but several examples of the many ways in which Giffels & Vallet's comprehensive planning-engineering services have pointed the way to greater output, lower costs and improved casting quality for the foundry industry. These services are discussed in a special Foundry Brochure. A copy will be mailed on request.

INDUSTRIAL ENGINEERING DIVISION

Giffels & Vallet inc.

DETROIT, MICHIGAN

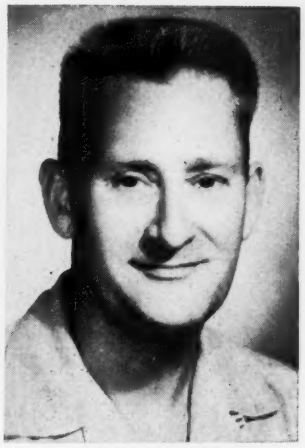
NEW YORK
CHICAGO
HOUSTON
WINDSOR, ONT.

ENGINEERS SERVING INDUSTRY FOR OVER 30 YEARS

DR. EDWIN R. SHOREY
. . . retires from university

PROF. PHILIP C. ROSENTHAL
. . . becomes department head

G. C. COLE
. . . Wysong & Miles v. p.



JAMES A. JOHNSON
. . . Indiana Steel gen. supt.

1949. He is chairman of the Birmingham Chapter of the AFS for 1955-56.

Dr. Edwin R. Shorey recently retired as chairman of the Department of Mining and Metallurgy, University of Wisconsin. A graduate of the university in 1908, he engaged in mining engineering and, following military service in World War I, joined Wisconsin's mining and metallurgy department in 1919. He served as its chairman from 1937-1940, and from 1952 until his retirement June 30. **Prof. Philip C. Rosenthal,** since 1950 professor of metallurgical engineering at the university, has succeeded Dr. Shorey. Prof. Rosenthal was graduated from the university in 1935, and previously was engaged in research at Battelle Memorial Institute, alternating with teaching at Wisconsin University.

C. A. Ahlstrom was appointed Philadelphia district manager, Bay State Abrasive Products Co., Westboro, Mass. A graduate of University of Michigan, prior to joining the company in 1948 he was associated with Norton Co., Worcester, Mass., Manning, Maxwell & Moore, New York, and Theodore C. Ulmer Co., Philadelphia. **Ben Guy** was assigned to sales engineering duties in the West Coast district. Until recently he represented the Rust-Oleum Corp. in the San Francisco Bay area.

G. C. (Jack) Cole, since 1951 foundry manager and a director, Wysong & Miles Foundry Inc., Greensboro, N. C., was elected a vice president. Mr. Cole was previously associated with National Farm Machinery Cooperative Inc., Bellevue, O., Forest City Foundries Co., Cleveland, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., Peoria Malleable Castings Co., and Caterpillar Tractor Co., Peoria, Ill.

Joseph H. McGraw, for 9 years sales office manager in Vanadium Corp. of America's home office in New York, was appointed assistant district manager in the Cleveland office. **Daniel A. Hackett** has succeeded Mr. McGraw in New York.

James A. Johnson was appointed general superintendent, Indiana Steel Products Co., Valparaiso, Ind. He joined the company in 1952 as foundry superintendent after 7 years as assistant general foreman of International Harvester Co.'s foundry department in Milwaukee. From 1940 to 1945 he was associated with Ordnance Steel Foundry, Bettendorf, Iowa. **Darrell Davis,** formerly foundry department foreman for Indiana Steel, has succeeded Mr. Johnson as superintendent of the foundry department.

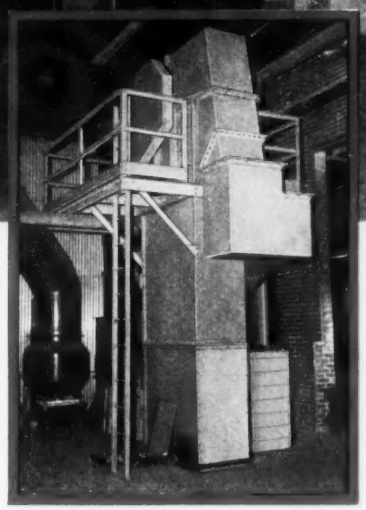
Dr. F. J. Dunkerley was appointed assistant general manager, Rolle Mfg. Co., Lansdale, Pa. Dr. Dunkerley became metallurgical consultant for the company 5 years ago and last year was named to organize and direct the Rolle Research and Development Center. Since then he was also appointed vice president-general manager, Rolle Research & Testing Inc., Hatfield, Pa. He received a doctor's degree from Carnegie Institute of Technology and after 4 years with Battelle Memorial

BEN GUY
. . . joins Bay State Abrasive

C. A. AHLSTROM
. . . Bay State district mgr.

JOSEPH H. McGRAW
. . . assistant district mgr.

DR. F. J. DUNKERLEY
. . . Rolle assistant gen. mgr.



This shot-return bucket elevator handles unusual demands at minimum cost.

Lynchburg Foundry uses Webster Equipment for Fast, Economical Movement of Shot and Refuse

The above Leak Proof Apron Conveyor handles refuse to separating station. Storage silo, shot-loading bins and collecting hoppers were also furnished by Webster.

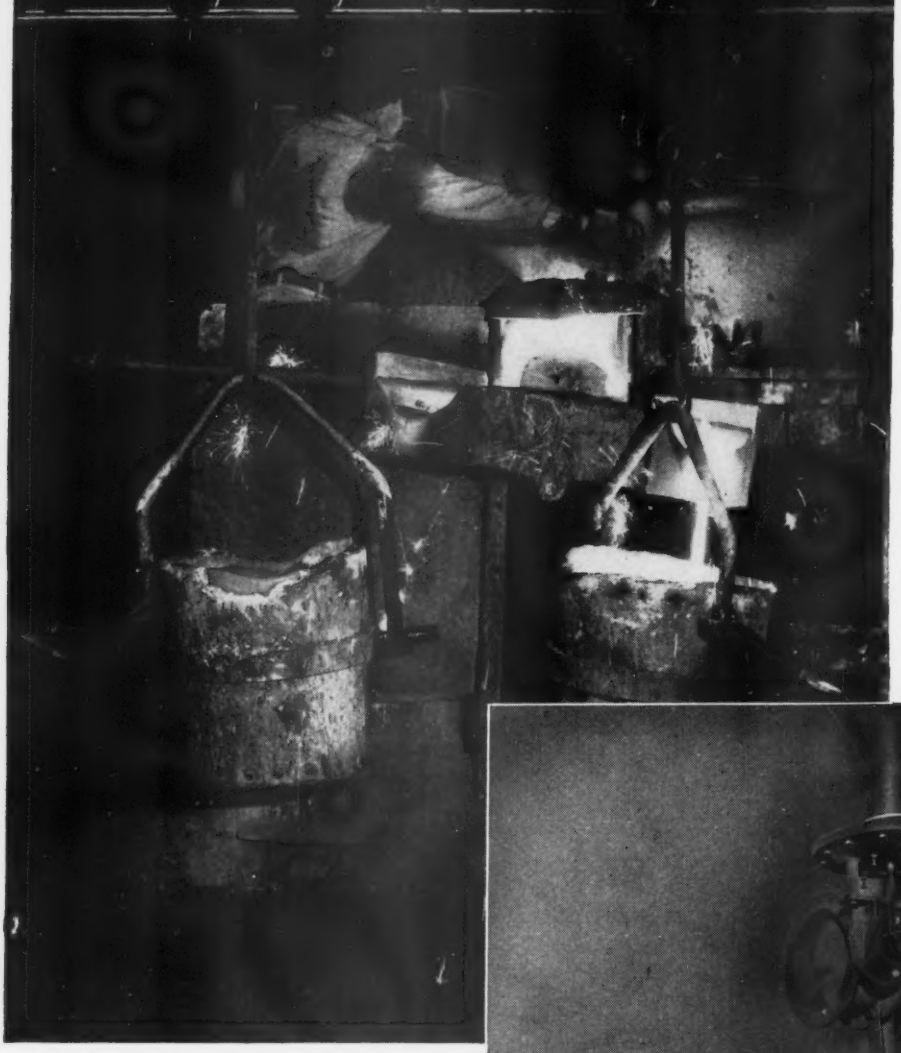
The economy, durability, and speed which Webster equipment provides this modern foundry operation can be yours on any conveying job. Your phone call or letter will bring a Webster engineer promptly at no obligation. Feel free to ask for this service.

WEBSTER MFG. INC.
TIFFIN, OHIO

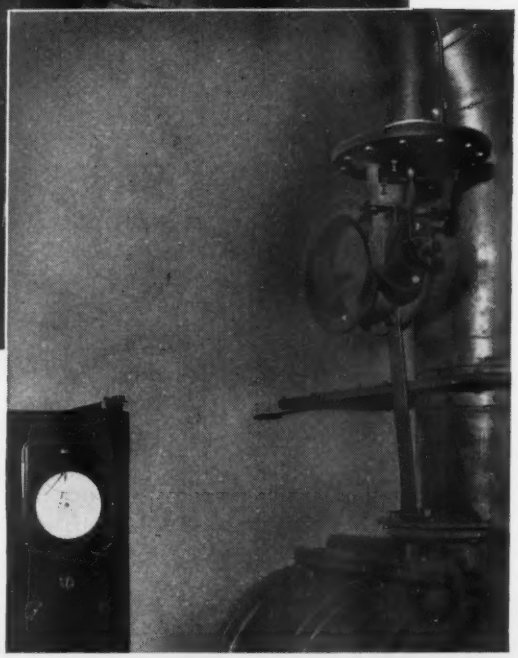
DEUSCHER FOUNDRY

Cuts Chilling Losses

...through Foxboro Air Weight Control



"When we operated our cupola without control of air weight, we had trouble holding proper metal temperatures throughout the heat. Combustion varied, spout temperatures varied, and we were rejecting too many light castings because of hard edges. Since we put Foxboro Air Weight Control on cupola blast, our chill tests are much more uniform, rejects are way down, and we don't have any oxidation difficulties."



Accurate control of combustion air for any melting requirement is easily set on Foxboro Air Weight Control Panel at the Deuscher Company. Controller actuates air motor on vent-valve. (On centrifugal systems, controller regulates valve in blast line.)

This report from Mr. Stanley F. Levy, Operations Manager of the H. P. Deuscher Company, Hamilton, Ohio, is typical. Foxboro Air Weight Control "weighs" air . . . automatically corrects for atmospheric changes. No matter what the weather, coke charge *always* gets the right amount of oxygen for best combustion — uniform melting — better castings. For full details, ask your nearest Foxboro sales engineer, or write **The Foxboro Company, 3210 Neponset Ave., Foxboro, Mass., U.S.A.**

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

CLAYTON D. RUSSELL
. . . AFS Chapter Chairman

ARTHUR S. BREITHAUPT
. . . operations, Dodge Steel

CLAUDE A. MARLOWE
. . . becomes executive v. p.

MAURRY R. PETERSEN
. . . joins Soll Metals Co.

Institute, Columbus, O., spent 10 years at University of Pennsylvania as professor of metallurgy also doing consulting work.

Clayton D. Russell, elected chairman of the Northern California Chapter of the AFS for 1955-56, is assistant sales manager, Phoenix Iron Works, Oakland, Calif. Mr. Russell was graduated from University of California in 1949. He is a third generation foundryman, following his grandfather, William L. Russell, founder, and his father, Samuel D. Russell, president, of Phoenix Iron Works. He is a former director of Northern California Chapter and was its vice chairman last year.

William M. Taylor was appointed assistant general manager, Lacledé-Christy Division, H. K. Porter Co., St. Louis. A graduate of Carnegie Institute of Technology and Harvard Business School, he joined the Porter organization in 1951 as market research and advertising manager of its Quaker Rubber Corp. division. Previously this year he was sent to the company's Pittsburgh office as assistant to the executive vice president.

Arthur S. Breithaupt, vice president and sales manager, Dodge Steel Co., Philadelphia, has been named vice president with responsibilities extending into the field of operations. He will also continue in his present capacity, a post which he has held since 1940. Active in Steel Founders' Society of America, Mr. Breithaupt was a national director and executive committee member in 1952-53.

Claude A. Marlowe, since 1949 sales manager, was elected executive vice president, Pittsburgh Metals Purifying Co., Pittsburgh. Mr. Marlowe attended Carnegie Institute of Technology and joined the East Pittsburgh plant of Westinghouse Electric & Mfg. Co. in 1936 as sales engineer. In 1938 he became associated with A. W. Cadman Mfg. Co., Pittsburgh.

Allen B. Hughes was appointed abrasive engineer, Bay State Abrasive Products Co., Westboro, Mass., covering eastern Pennsylvania, Maryland, Virginia and Washington. A graduate of Hobart College and Babson Institute of Business Administration, he joined Bay State in 1953.

Maurry R. Petersen has been appointed sales engineer in Ohio for George Sall Metals Co., Philadelphia. He will make his headquarters at 2596 Ashurst Rd., Cleveland.

C. O. Petersen was appointed district sales engineer in Pittsburgh and surrounding areas, W. W. Sly Mfg. Co., Cleveland. He was formerly associated with the Pittsburgh division of American Smelting & Refining Co., Basic Magnesium Inc., Las Vegas, Nev., and was a sales engineer of industrial machinery with headquarters in Pittsburgh. **K. G. Phillips** has been appointed district sales engineer in Sly's branch office recently opened in Los Angeles. A graduate of Ohio State University, he has been with the company 8 years as assistant sales manager. Previously he was associated with Freedal Machine

WILLIAM M. TAYLOR
. . . assistant general mgr.

ALLEN B. HUGHES
. . . Bay State Abrasive sales

C. O. PETERSEN
. . . Sly Mfg. Pitisburgh sales

K. G. PHILLIPS
. . . Los Angeles sales, Sly Mfg.

& Engineering Co., Willoughby, O. **Ing. Santiago Soto Martinez** has been appointed representative for the company in Mexico City, Mexico. He was graduated from Michigan College of Mining and Technology and until recently was manufacturers' representative for managanese, steel, welding materials, etc.

Arthur B. Morse, for the past 5 years California district manager, Mexico Refractories Co., Mexico, Mo., was appointed vice president and western sales manager. Mr. Morse

ARTHUR B. MORSE
. . . Mexico Refractories v. p.

is a graduate of University of Southern California and for 3 years was vice president-assistant director of sales, Laclede-Christy Co., St. Louis, prior to joining Mexico Refractories Co.

William L. Kimber, since 1940 sales engineer in Leeds & Northrup Co.'s Buffalo office, was named district manager there, succeeding **Joseph M. Jackson** who was appointed manager of district sales in Philadelphia, home office of the company. **W. Spencer Bloor** was made Atlanta district manager, replacing **William A. Macan III,** recently named Cleveland district sales manager. Mr. Bloor has been sales engineer in the Chicago office since 1946.

Gordon Lefebvre, president-general manager, Cooper-Bessemer Corp., Mount Vernon, O., has resigned because of ill health. **Lawrence F. Williams,** a director and secretary of the company, has succeeded Mr. Lefebvre. Mr. Williams joined the company in 1926. **James E. Brown,** treasurer, was also named secretary.

Arthur J. Shivers Jr. was appointed sales engineer in the Philadelphia area for Kinney Mfg. Division, New York Air Brake Co. Boston. **Jackson A. Brower** has been added to the New York district sales staff and **Thomas A. Sowin** has joined the Chicago district sales staff, as sales engineers.

S. C. Massari, former technical director of the American Foundrymen's Society, will present the Charles Edgar Hoyt Memorial Lecture at the 1956 AFS Convention in Atlantic City, N. J., May 3-9. **Hyman Bornstein** has been selected as the Hoyt lecturer for 1957.

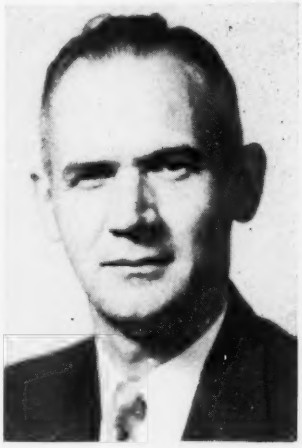
LEON H. DECKER, appointed assistant works manager, Foundries and Pattern Division, Allis-Chalmers Mfg. Co., Milwaukee, as reported in September

Gifford Leece, president, Gardner-Denver Co., Quincy, Ill., was elected chairman of the executive committee to succeed **Ralph G. Gardner,** who recently retired as treasurer and head of the executive committee. Mr. Leece, who joined the company in 1922, became president in 1954. Mr. Gardner continues as chairman of the board and a member of the executive committee. **Alexander G. Lindquist,** vice president and formerly secretary-comptroller, was named treasurer and executive committee member. **Charles M. George,** assistant to the president, was named secretary, and **William H. Miller,** assistant treasurer.

R. E. Rogers was appointed manager of West Coast sales activities, Foxboro Co., Foxboro, Mass., with headquarters at the company's new branch factory in San Leandro, Calif. **E. W. Pitt** has been made Los Angeles branch manager, a position Mr. Rogers held since 1946. **D. P. Thomas** takes over Mr. Pitt's former duties as branch manager in Shreveport, La. Other appointments include: **M. F. Parr,** regional engineer in San Leandro; **C. E. Heegard,** industrial engineer in Los Angeles; and **C. J. DeVilbiss,** transferred from Dallas, Tex., to Shreveport, as industrial engineer.

Ashley B. Sinnett, educational director of the American Foundrymen's Society, has also been named assistant secretary. Mr. Sinnett, a graduate of Michigan State University, joined the AFS staff in 1954.

W. C. Truckenmiller has joined Albion Malleable Iron Co., Albion, Mich., as assistant technical director. A graduate of University of Michigan, Mr. Truckenmiller for 12 years was associate professor of production engineering there, and was previously associated with the A. C. Spark Plug Division, General Motors Corp., Detroit.



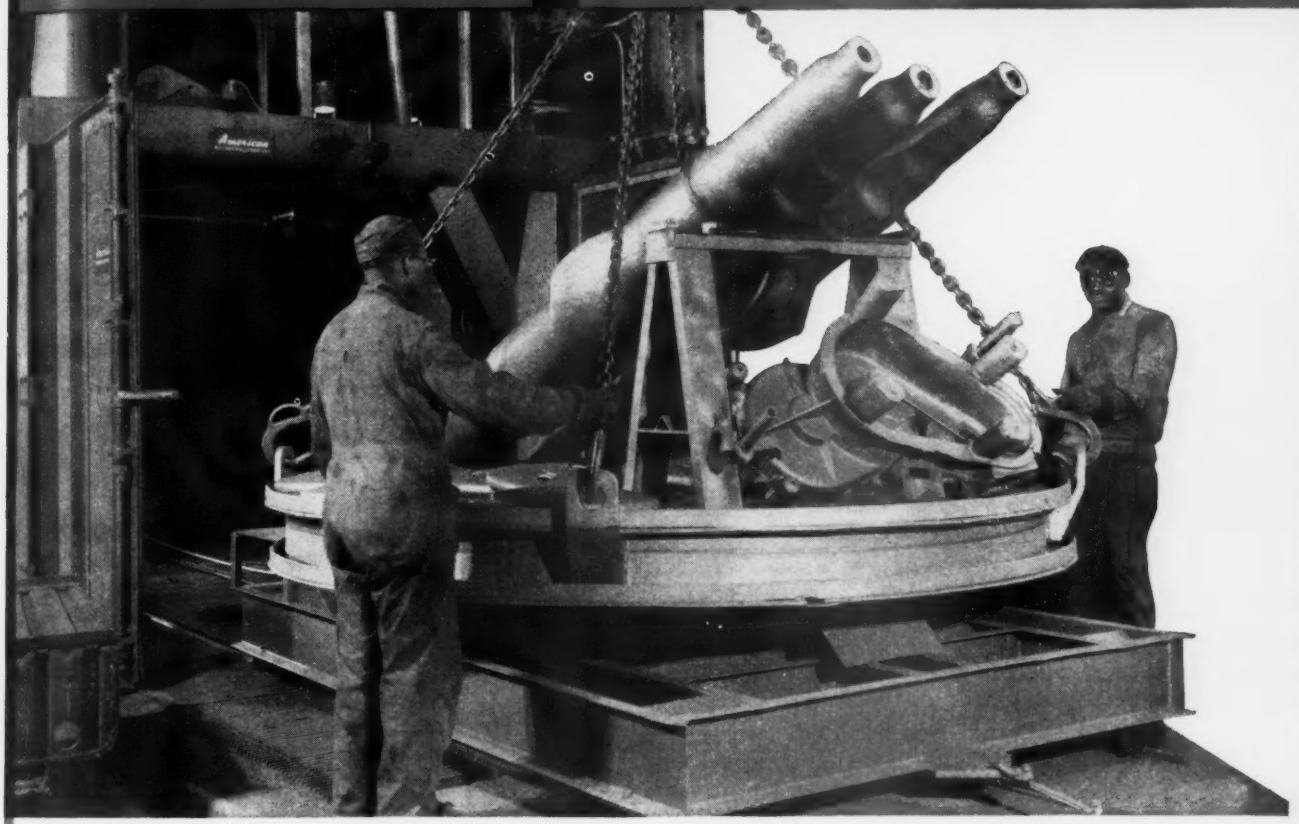
W. C. TRUCKENMILLER
. . . joins Albion Malleable

A. M. Kohler, since 1947 vice president, Babcock & Wilcox Co., New York, and head of its Refractories Division, has retired. **J. E. Brinckerhoff,** who has been manager of the refractories division since 1953, will be in charge of division activities. Mr. Kohler joined the company in 1913 at the former Bayonne, N. J., plant and became general manager of the Refractories Division in 1930. Mr. Brinckerhoff, a graduate of Cornell University, joined the company in 1919, and was assigned to development of refractories in East Liverpool, O., later becoming division sales manager.

A. E. Nehrenberg, research laboratory supervisor, and **Peter Lillys,** research metallurgist, Crucible Steel Co. of America, Harrison, N. J., will receive the 1955 Henry Marion Howe Medal Award of the American Society for Metals during its annual meeting in Philadelphia, Oct. 17-21.

cleaning costs slashed 40%

Wheelabrator® blasts the props from under cleaning costs



A Wheelabrator Car-Type Room, replacing a large airblast room, has reduced cleaning costs 40% for a prominent Chicago steel foundry.* It slashed 28 man hours daily in direct cleaning room labor. Cleaning large steel castings weighing up to 8,000 pounds each in just 12 minutes, it reduced cleaning time to a mere fraction of the airblast time required. This airless Wheelabrator Room provides improved surface cleanliness to reduce grinding and chipping costs. Blast the props from under your cleaning costs. Use a high-production, versatile Wheelabrator Room. Write today for Bulletin 854 which describes machine designs and includes actual job-study reports. Take advantage of Wheelabrator engineers' long experience in designing machines for any requirement.

*Name on request

Use genuine Wheelabrator Long-Lyfe wear-resisting parts

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trail blazer of industrial progress

formerly American Wheelabrator & Equipment Corp., 505 S. Byrkit St., Mishawaka, Indiana

The Illini Union Building is one of several hundred which comprise the facilities at the main University of Illinois campus at Urbana-Champaign

California, Illinois, Kentucky join

Foundry Educational Foundation Program

FOUNDRY Educational Foundation programs are being initiated at three more outstanding universities this fall. New participants in the FEF program are the University of California at Berkeley, the University of Illinois and the University of Kentucky. They bring the total number of schools actively participating in the foundry industry's engineering educational program to 16.

Establishment of a program at the University of California enables the Foundation to achieve one of its early goals—coast-to-coast operation. In addition, the University of Illinois and University of Kentucky programs are situated to supplement services to the industry performed by institutions already in the program.

University of Illinois—Main campus and administrative offices of the University of Illinois are located at Urbana-Champaign, Ill., one community composed of two municipalities on opposite sides of a street passing through the campus. Fourteen colleges and schools at this site offer liberal arts, professional courses and advanced work. The university also offers freshman and sophomore work in liberal arts, commerce and engineering at the Chicago Undergraduate Division, located at the Navy Pier, in that city.

The College of Engineering was one of the original units when the university opened in 1868. One of the first machine shops and foundries for student laboratory work in any school in the country opened at the institution in 1869.

The Engineering Experiment Station was established in 1903 as an organization within the College of Engineering and was the first of its kind in America. Its purpose is to stimulate engineering education and to investigate problems of importance to professional engineers, industrial interests and the state. It has published more than 500 bulletins and circulars.

Total enrollment is about 24,000 students, who are taught by 4300 teachers. President is Dr. David Henry, and Charles C. Caveny is executive dean of the Chicago Undergraduate Division. Dean of the College of Engineering at Urbana is W. L. Everitt. Prof. James L. Leach is in charge of cast metals instruction under the immediate direction of Prof. N. A. Parker, head of the department of mechanical engineering. F. W. Trezise is associate dean, College of Engineering at the Navy Pier Undergraduate Division, where Prof. Roy W. Schroeder is in charge of foundry instruction.

University of Kentucky—Located at Lexington, Ky., the University of Kentucky was founded in 1865 as a part of Kentucky University. In 1878, the College of Agriculture and Mechanic Arts was separated from Kentucky University and in 1916 became the present institution. The College of Engineering was organized in 1918 by the consolidation of the College of Civil Engineering, the College of Mechanical and Electrical Engineering and the College of Mining Engineering.

More than 600 faculty members teach over 6400 students at the university. President is Herman Lee Donovan. Daniel V. Terrell is dean of the College of Engineering, and Charles S. Crouse heads the department of mining and metallurgical engineering. Dr. Roy E. Swift is in charge of cast metals instruction.

University of California—The University of California was founded in 1868 and has eight different campuses, at Berkeley, Davis, La Jolla, Los Angeles, Mount Hamilton, Riverside, San Francisco and Santa Barbara, Calif. The Berkeley campus is situated on the eastern shore of San Francisco Bay, directly opposite the

Above—View of the Engineering Building at the University of Kentucky, Lexington, Ky. Foundry facilities are among those housed in the building

Below—Students at the University of California at Berkeley, Calif., demonstrate pouring practice to a group of visitors to the foundry laboratory

The Engineering Materials Laboratory at the University of California contains one of the finest equipped testing laboratories in the United States

beautiful, world-famous Golden Gate.

The charter granted the university by the state called for a college of agriculture and engineering, and the Colleges of Mining, Mechanical and Civil Engineering were organized early in the school's history and grouped under the heading of the Colleges of Engineering.

Robert Gordon Sproul is president of the university, and Clark Kerr is chancellor at Berkeley. Morrough P. O'Brien is dean of the College of Engineering, Everett D. Howe is associate dean, and E. Paul de Garmo and James L. Meriam are assistant deans. Prof. James S. Campbell is in charge of the cast metals instruction program, under the direction of Prof. de Garmo. The Berkeley campus of the university has over 17,000 students and 1900 teachers.

The Foundry Educational Foundation was organized in 1947 to foster and improve education in the United States in the field of foundry science, engineering, practice and operation in colleges and universities and to encourage and assist students in acquiring education and training in these fields. Only about 8.5 per cent of engineering students throughout the country took courses in cast metals when the Foundation started, but over 30 per cent now take at least the basic foundry course. In all, approximately 6000 students now take foundry courses each year at institutions participating in the FEF programs.

Most of the Foundation's funds are used directly in the scholarship program now in effect at the schools. Selection of recipients and the amounts awarded to individual scholarship holders rests entirely with the appropriate committees at each institution. Awards are made on the basis of these points: 1. Interest in the foundry industry. 2. Scholastic capabilities. 3. Desirable personality and character traits. 4. Need for financial assistance.

Other universities in the program include University of Alabama, Case Institute of Technology, University of Cincinnati, Cornell University, Illinois Institute of Technology, University of Michigan, Ohio State University, Pennsylvania State University, Purdue University, University of Wisconsin, Michigan State College, Massachusetts Institute of Technology and Missouri School of Mines and Metallurgy.

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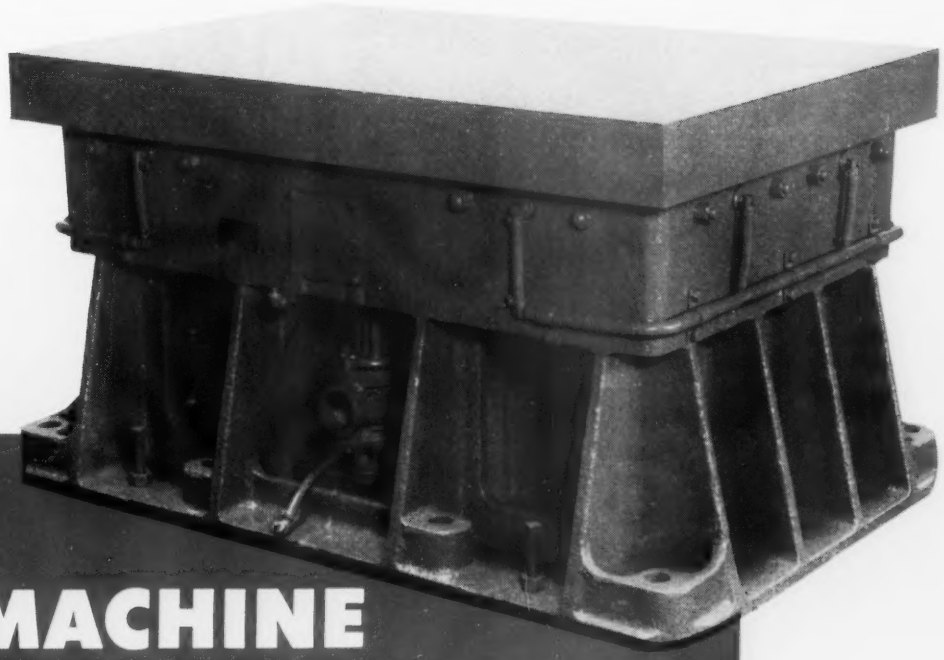

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Every machine features the Herman "Bunter-Control" operating valve which exactly proportions the amount of air to the load on the machine. Wear at cylinder and plunger is kept to an absolute minimum and alignment is constantly maintained through the use of wearing plates in the jolt machine base.

Photos show the Herman Jolt at rest, and with the cast steel table plate and cast steel plunger removed to show the machine interior construction.

Write us for detailed information . . . there is a size and type Herman Molding Machine for all foundry operations.

HERMAN

Best Known Name in Molding Machines

By RALPH L. LEE

Ambition and the Point of Diminishing Return

"Just about as many people fail to cash in on their talents because of too much personal ambition as those who fail through laziness"

I IMAGINE there is always a point of diminishing return on the curve of almost every form of energy, including personal ambition. In fact, there is no longer any doubt in my mind after all these years of Man-to-Man give and take that just about as many people fail to cash in on their talents through an overdose of personal ambition (eager-beaverism) as those who fail from plain unadulterated laziness (lead in the pants-ism).

I'm not just pulling this observation from the air, but the conclusion has been forced upon me as a result of hundreds of personal interviews over the years with heartsick eager-beavers who have come to me either crying or cursing over the injustices they think have deprived them of their just dues or wrecked their schedule for forging ahead.

The surprising thing is that these eager-beaver interviews are not limited to inexperienced striplings just starting out, but also involve greying travelers rounding the curve toward the end of the road.

Some time ago I visited, at his request, a long-time friend I greatly admire. He's a master at the craft. The reason he first gave me for the visit turned out later to be far afield from the real reason. While going 'round Robin Hood's barn several times, he dropped fairly well disguised tips and clews to something eating him 'way down inside.

It would have been unthinkable for me to call his spade a spade, for I know he would have denied even having a trowel—and with some semblance of a huff. Without bragging he managed to let the cat out of the bag that he was not only on top of his job, but so far ahead that his associates—and particularly his boss—were having a most difficult time trying to keep up with him. And not being able to follow him, or let's say to speak the same language, they couldn't quite grasp the significance of his forward planning and thinking.

In view of the fact that he had been sought as a sorely needed expert in an emergency and came within an ace of not taking the job, he just assumed that his prestige among his associates would be taken for granted. The fact that the rating he had given himself was not fully or generally accepted by all concerned fretted him no end. The only way he could account for it was envy.

I gathered that something else was eating him. The nature of his special field, together with his hobbies, had brought him into a close personal relationship with men of means and heavy influence. In fact, it was through such influence that he was called to his present job. Such sponsorship, he felt, entitled him to special consideration.

While he did not make a practice of it, he did, from time to time, seek the aid of his influential friends on the outside to get his way on the inside. Unfortunately, the very friends who had been most useful to him moved out of reach. This left him squarely on his own to deal with his boss and his associates solely on the basis of the work he had been hired to do.

This loss, plus a turn-down on a proposal he had been fighting for tooth and toenail, failure to consult him on several important organization changes (which were really out of his bailiwick) together with a lessening of prestige all combined to work him up into a temperamental tizzy. I haven't the slightest doubt that this tizzy was seriously interfering with his work.

Although no direct mention was made of it, I am quite sure that my friend was just about ready to call it quits and start looking for a job better suited to serve the plans he had for himself.

With only a few changes in details this interview, as veiled and disguised as it was, followed exactly the same pattern as most of those I have had through the years involving folks who were not getting themselves ahead as fast and as far as they had planned, folks who were much more concerned with their careers than they were with their work.

I can't help but feel sorry for folks like this who get so far off the beam of reality, not because of their disappointment in failing to reach their goals, but the hour-by-hour, day-by-day and job-by-job work satisfaction they have cheated themselves out of while reaching for the moon.

Appropos of nothing, and still avoiding a mention of what was really eating my friend, I quoted a little piece I had written many years ago.

"I have just about given up hope of ever finding a job made up entirely of the things I like to do. For every job I've had so far turned out to be made up of 70 per cent of chores I did not like, 20 per cent that were just so-so and 10 per cent that I was really nuts about. I also discovered that every promotion I have had and piece of good fortune in business came from making myself do the things that had to be done

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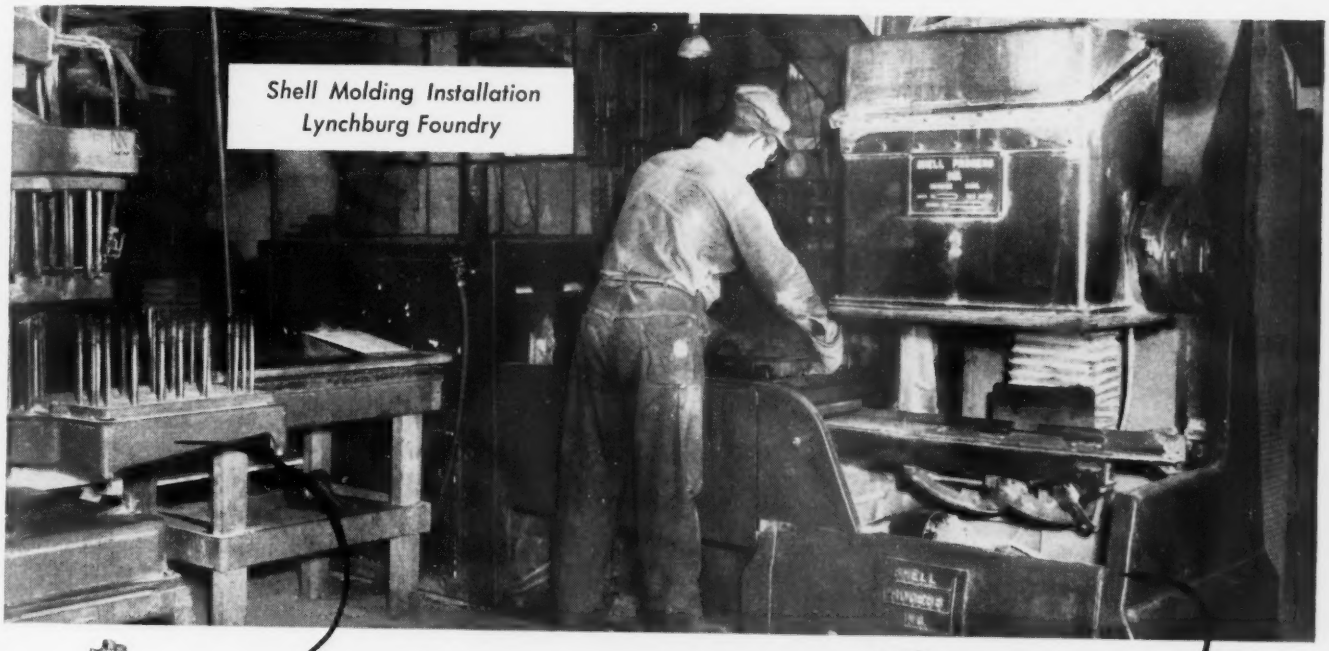
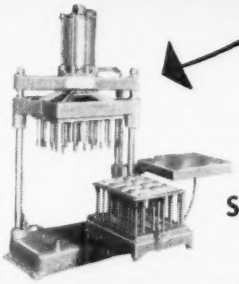
model foundry 'shows how' for tomorrow's plants





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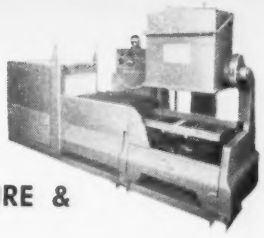

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While the Lynchburg story proves the greatness of a foundry, it proves, too, the greatness of the equipment it uses. Lynchburg's Shell Molding Installation, which has grown to a capacity of 75 to 100 tons per day, first began operations with 4 Shell Process molding machines and 4 Shell Process Bonding Fixtures.

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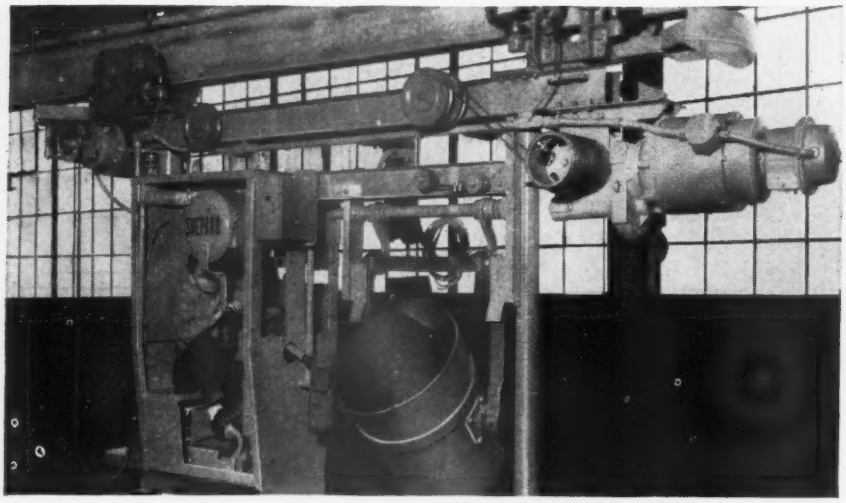

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Write today for Bulletin describing Shepard Niles Hot Metal Carriers. Ask to have a representative call. He'll show you how to mechanize your foundry for labor-saving, low-cost handling.

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whether I like them or not."

I told my friend that now, some 35 years later, I see no reason for changing the universal and standard composition of all jobs, but that I did want to add another fact. This fact is that the 70-20-10 job analysis ratio also applies to the kinds of people you'll find around you on every job you take—those you can easily do without, those you can take or leave, and those you're really keen about. I added that I also feel quite sure that making yourself like the people you have to work with is no small factor in really getting ahead.

Most organizations are peppered with poor unfortunate souls who do not know that there is no such thing as an ideal job and that the very job they'd be willing to sell their souls for, if they ever got it, would turn out to be a 70-20-10 deal. Those who know this truth, or suspect that it is so, take the job they've got and start from there to go places.

Those who are ignorant of this truth become vocational tramps, working with one hand tied behind them, moving from place to place, looking and fighting for the ideal job, with ulcers most of the way.

Ninety per cent of the outstandingly successful people I know got so busy doing each job they had to do and solving the problems involved they never found time to plan a career. But coming up for air every once in a while they found themselves much farther down the road than they expected to be.

Stephens-Adamson Appoints Stocking Distributors

Thirteen authorized stocking distributors have been appointed by Standard Products Division of Stephens-Adamson Mfg. Co., Aurora, Ill. These organizations will handle the company's line of belt conveyor idlers and return rollers, centrifugal loaders and pilers, car pullers, winches and allied conveyor machinery. Included in the group are the following:

J. R. Banbury Equipment Co., 295 Saw Mill Run Blvd., Pittsburgh 26; Southern Chemical Sales Co., Board of Trade Bldg., Louisville; P. J. Hagerty Equipment Co., 800 South Adams St., Peoria, Ill.; Wisconsin Bearing Co., 915 North Market St., Milwaukee 2; Buffalo Rubber & Supply Co., 526 Niagara St., Buffalo 1; Dabney-Hoover Supply Co., 45 West Virginia Ave., Memphis, Tenn.; and Harshberger Equipment Co., 425 Southeast Ninth Ave., Portland 14, Oreg.

Others include Eastern Engineering Sales Co., 33 Allerton, Roxbury 19, Mass.; Stephens-Adamson Mfg.

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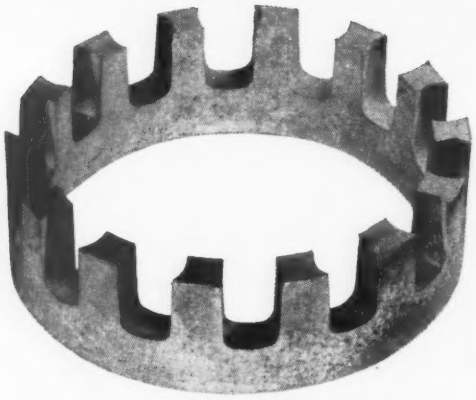

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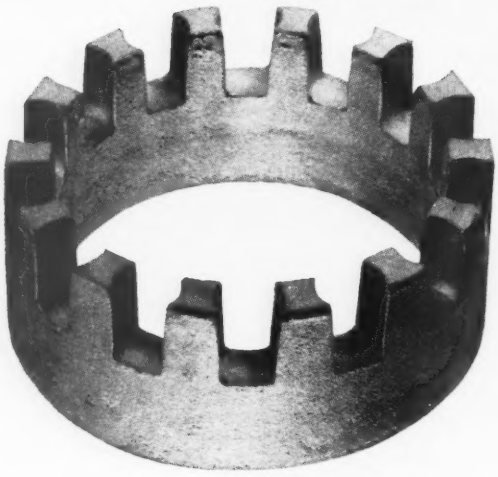

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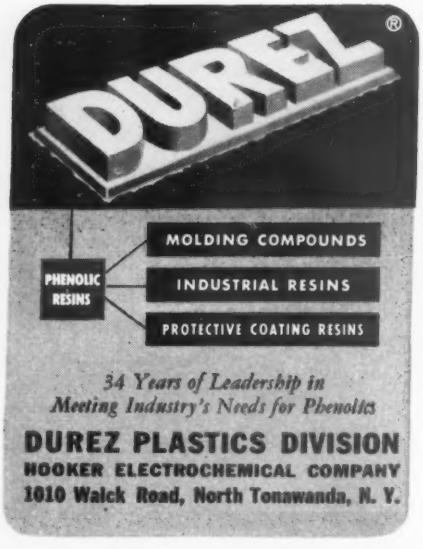

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Government Report Gives Case Study Data on Five Foundries

A recent U. S. Department of Labor report presents case study data on productivity and factory performance in five small gray iron foundries. In each of the case studies the sections dealing with production describe manufacturing techniques, plant layout, products, machinery and equipment used, man-hour requirements by departments and operations and functions of management in co-ordinating production.

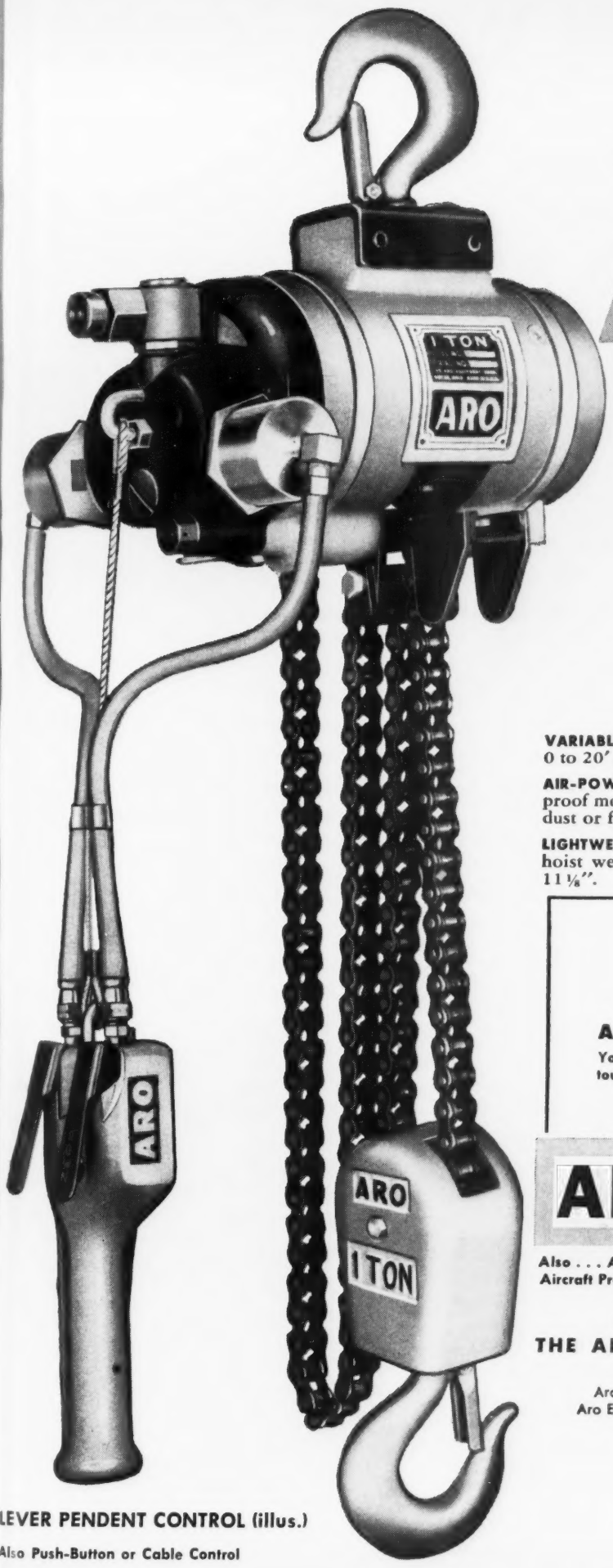
The hiring and training of new workers, selection of supervisors and the duties of plant supervision at various levels also are described. In addition, information is given on labor-management relations and employment characteristics. Finally, cost aspects of each foundry's operations are treated in detail. Percentage ratios are given to show relationship between material, labor and other manufacturing costs. Distribution and manufacturing costs are noted and sales techniques described.

Report 85 is available free from U. S. Department of Labor, Bureau of Labor Statistics, 105 West Adams St., Chicago 3.

Presents Data on Molybdenum

All available technical and fabricating data on arc-cast molybdenum has been compiled in a 72-page booklet just published by Climax Molybdenum Co., New York. It is designed to provide persons interested in the high-temperature applications of the metal with a complete picture of where it stands today and what are its possible uses in the near future. Melting point of molybdenum is about 4750°F, and it has unusual strength at high temperatures.

Its properties make molybdenum ideal as a refractory metal except for one drawback: It tends to oxidize rapidly and ruinously at temperatures over 1000°F. This deficiency has held back structural uses of metallic molybdenum, but recent progress is viewed with high optimism. Persons interested in metallic molybdenum and molybdenum-base alloys may obtain a copy of the booklet free upon request to



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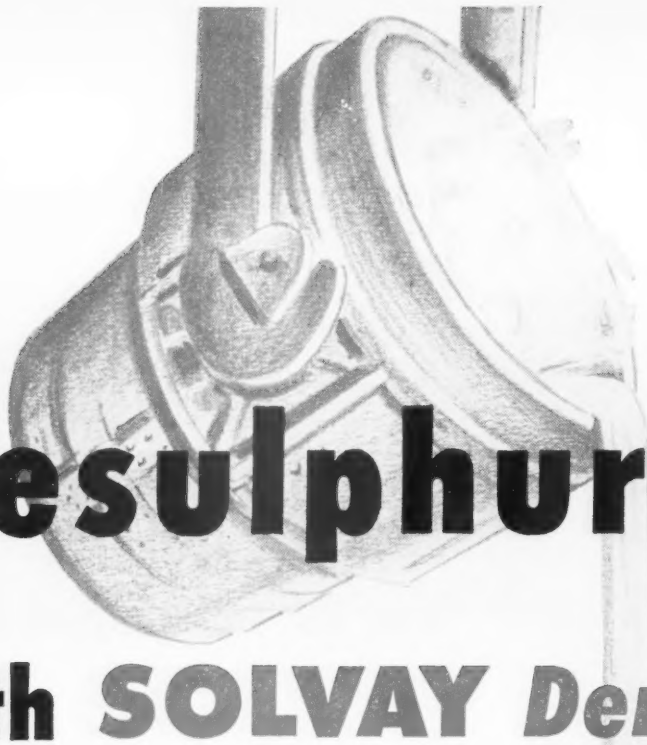

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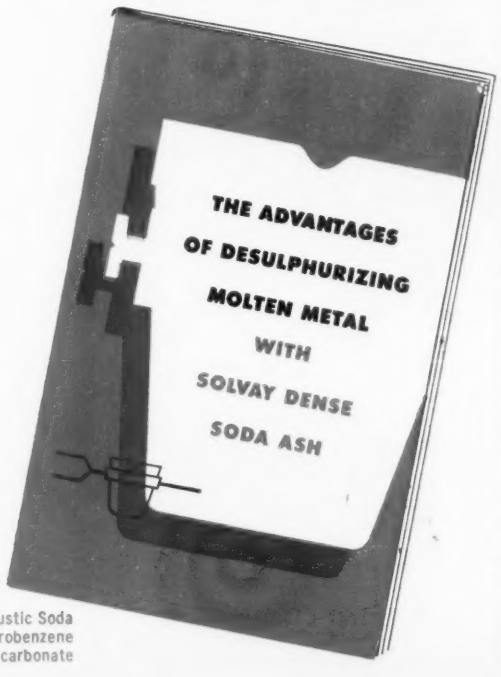
*In Western Hemisphere Countries.



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the director of technical information, Climax Molybdenum Co., 500 Fifth Ave., New York 36.

Iron Castings Production Sets Record in Britain

Output of gray and malleable iron castings in the United Kingdom set a new high record for the first half of 1955 at 2,014,140 tons, according to the Council of Ironfoundry Associations, London. This compares with 1,891,510 tons in the first six months of 1954. The second quarter showed a 7.7 per cent gain over last year, against a 5.4 per cent increase in the first quarter.

Automobile castings, including tractors, were particularly active in the second quarter with a 29 per cent increase compared with a year ago. Foundries making castings for the engineering industry generally operated at nearly 10 per cent ahead of the 1954 level. Production of ingot molds, pressure pipe and building and domestic castings was also higher than a year ago.

Booklet Covers Cost Cutting

New publication shows executives how to determine when and where production costs are out of line. Published by the American Management Association, the 128-page booklet, Special Report No. 4, *Tested Approaches to Cutting Production Costs,* draws upon material presented at a recent AMA special manufacturing conference.

Cost of the volume is $3.75 to nonmembers, $2.50 to AMA members. Address requests to Publications Sales Dept. P, AMA, 330 West 42nd St., New York 36.

Book Review

Brand of the Tartan, by Virginia Huck, cloth, 6 x 9 in., 260 pages, published by Appleton-Century-Crofts Inc., New York. Price $3.50.

This is the story of an American corporation, the Minnesota Mining & Mfg. Co., better known as 3M. It is a case history in the practical operation of the American free enterprise system. The record covers the first half of the present century from the launching of the company in 1902 to its record today in being judged one of the five best-managed corporations in the United States. The book tells how it all happened—the failures as well as the successes, and of the men whose vision, hard work and loyalty made the growth possible.

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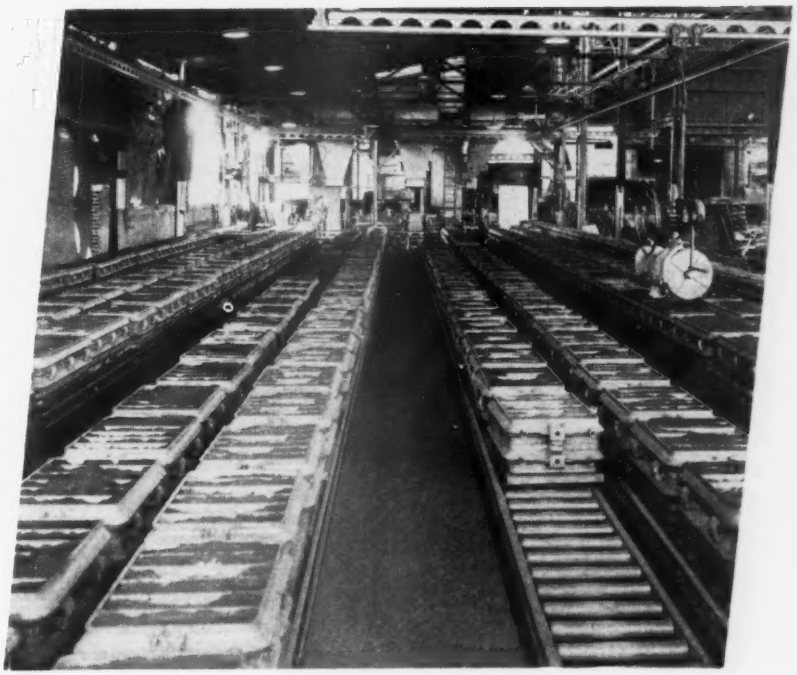
Engineers and Builders of Conveyers and Conveyer Systems for American and Canadian Industry for 50 YEARS . . .



● It was just 50 years ago, in 1905, that the first Mathews Conveyers were designed and built—and applied in a Minnesota warehouse. From that early equipment has evolved some very spectacular continuous-flow conveying systems—indeed, some of the real "show jobs" of the conveying industry.

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Metal Temperature and the Iron Melting REVERBERATORY FURNACE

By CARL G. DE LAVAL
Pittsburgh Alloy Co.
Pittsburgh

ATTAINMENT of satisfactory metal temperature in the gas or oil-fired reverberatory furnace demands a hot hearth and active transfer of heat units to the liquid metal bath during the superheating period. This latter cannot be emphasized too strongly.

How the superheating period helps temperature attainment is best shown by likening the melting of iron to the melting of ice. When ice melts, the resultant water will not go above its melting point of 32°F until all the ice is melted. Then the water will pick up temperature.

In the melting of iron at the throat of this furnace, the liquid iron as it forms will have an initial temperature corresponding to its melting point. Substantial temperature increase in the metal bath pool will not take place while low-temperature freshly melted liquid iron flows from the throat into the metal bath pool. It is true that there will be some pickup in temperature, but this will not be substantial until the entire metal charge has been melted. Therefore, if the transfer of heat units is *not interfered with,* metal bath temperature will increase until thermal equilibrium has been reached.

How To Improve Heat Transfer—This article is a review of practical ways and means of improving heat transfer to the liquid metal bath and avoiding conditions which might retard this heat transfer. By these means the reverberatory furnace operator may improve metal temperature if he so desires. Final metal tap temperature is somewhat related to the empty furnace heat-saturated refractory temperature before melting. In good operation this empty furnace refractory temperature will run about 150°F higher than the final metal tapout temperature. In reading the empty furnace refractory temperature it is best to take readings sighting on the hearth surface.

The attainment of good metal temperature depends upon the proper functioning of three parts of the furnace—the burner system, hearth and slag. Some would include the throat, but the throat should not be looked upon as a "damper" control. It should only function as an effective heat release opening and as a "selector" orifice preventing metal solids from rolling on into the hearth and at the same time facilitating the free flow of liquid metal from the throat onward into the hearth. The proper functioning of the burners, hearth and slag are vital in the attainment of metal temperature.

The burners provide the heat units required for melting and superheating to temperature. The burner system must be of such type and arrangement as to deliver sufficient heat units to the cold metal at the throat to cause rapid melting and subsequently sufficient additional heat units to the bath to superheat to the desired temperature.

Burner Angle Important—In performing these two functions the angle of the burners to the horizontal is quite important. Most new equipment has at least a 15-degree burner angle, which gives quicker and faster melting than older models having a lesser angle. The flame impingement angle should be at least 15 degrees for rapid meltdown and superheating. This may be done either by structurally changing the angle of the burners or by tilting the burner tile slightly. The latter may be rather rough service for the tile refractory but within reasonable limits will produce the desired condition.

Short off-the-burner-tile flame development is an important requisite, otherwise too much heat is lost through the stack. To do this requires the services of an experienced burner expert. Some commercial burners do not have a very short stubby flame and long stack stingers are the result. The burner expert can materially shorten up the flame by creating turbulence in the air-fuel mixture close to the burner tip.

Internal furnace pressure caused by the metal charge in the stack sometimes seriously restricts heat release during the meltdown. This should be checked by measuring the rate of flow of the fuel. If there is a major reduction in the rate of fuel input, the expert should again be consulted and means taken to maintain a substantial heat release rate by the burners during meltdown.

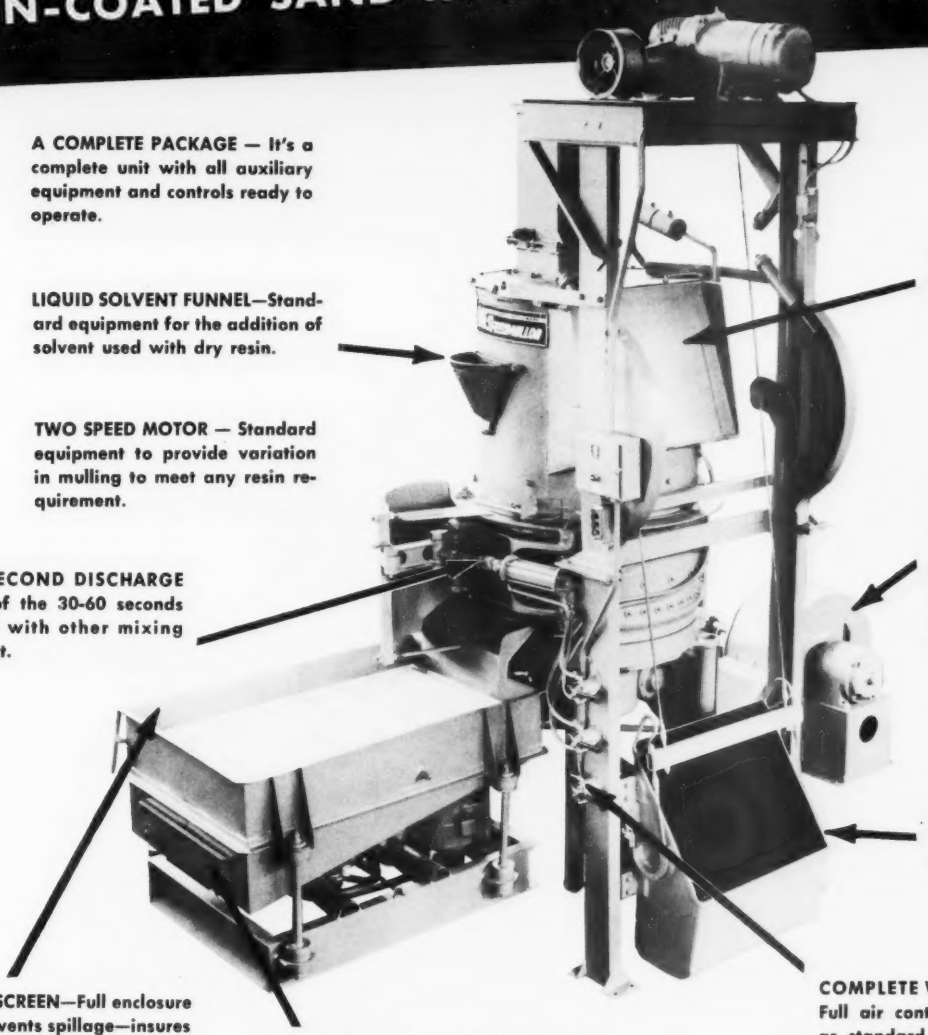
Flame quality will affect temperature. The simplest approach to this problem is to adjust the fuel-to-air ratio to obtain maximum flame temperature. This is done by observing refractory temperatures. An adjustment giving maximum heat-saturated refractory temperature will indicate maximum flame temperature and also give the most efficient burner operation.

Internal Furnace Pressure—Reference was made above to internal furnace pressures developing during the meltdown and it was recommended that means should be taken to prevent such internal furnace pressures from materially decreasing the heat release of the burner system.

This pressure is the result of temporarily increased obstruction to the passage of gases between metal pieces during meltdown. Unless the burner system increases its pressure head to compensate for this increased resistance, the penetration of heat units into the metal pile will be seriously curtailed and the rate of melting materially retarded. In this latter case only radiation and conduction play an important part in melting. However, if the burner system increases its pressure head to compensate for the temporary back pressure, convection heating will be added to the radiation and conduction heating. The introduction of substantial convection heating in this manner is important as it may show as much as a 20 per cent cut in fuel costs.

For those who are interested in the

COLD PROCESS, FREE-FLOWING, NON-CLUMPING, RESIN-COATED SAND IN 5 MINUTES INSTEAD OF 25



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Now, free-flowing, non-clumping, resin-coated shell molding sands may be prepared by the cold process in the new Model CP Shell Speedmullors in one-fifth the time required with other mixing equipment. Available in six sizes with capacities of from 2,000 to 9,000 pounds per hour, these new Shell Speedmullors operate on total cycle times of approximately five minutes on all typical resin-coated sand mixtures. These units are available as complete packages with all auxiliary equipment and controls ready to do the whole job on installation.

For the first time the operator has full control over all of the variables of cold process preparation. Three position mullor wheel spacing and two speed mullor motor provide a wide range of variation of mulling pressure.

In addition, the volume of air blown *through* the sand mass (only the Shell Speedmullor provides this feature) may be varied from zero to maximum to meet requirements. These new units handle either liquid resin additions or solvent and dry resin additions. Mulltrolmatic — the ultimate of automatic control — is available to control every phase of the operation.

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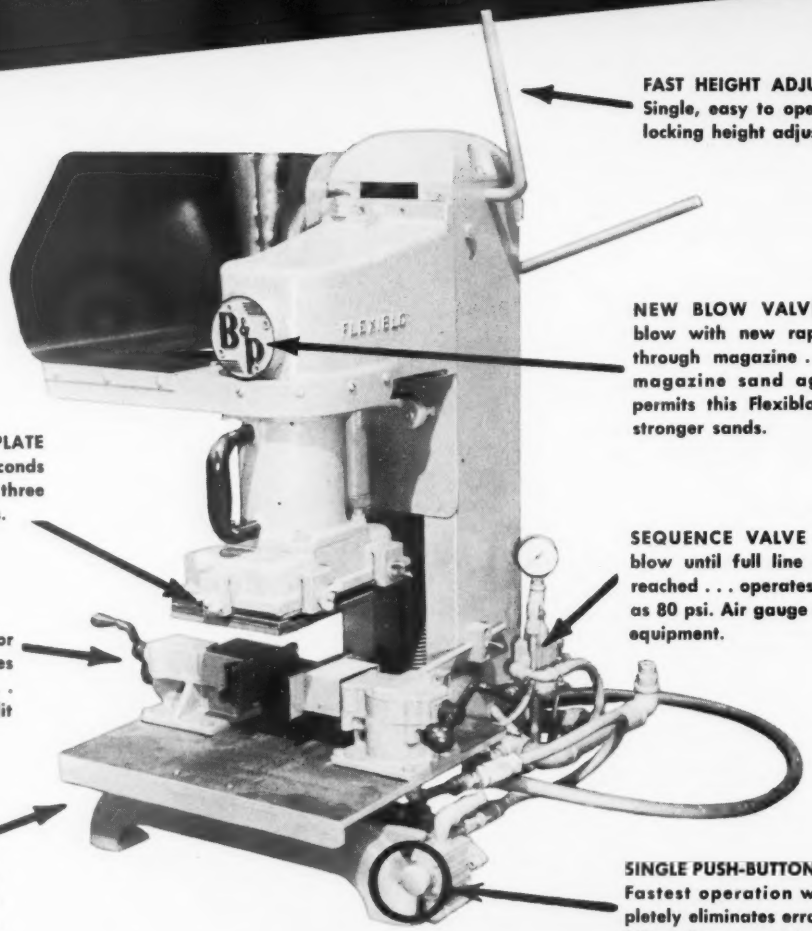

FAST HEIGHT ADJUSTMENT — Single, easy to operate, quick locking height adjustment.

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QUICK CHANGE BLOW PLATE Blow plates changed in seconds ...just necessary to loosen three hand-turned thumb screws.

SEQUENCE VALVE — Prevents blow until full line pressure is reached . . . operates on as little as 80 psi. Air gauge is standard equipment.

REMOVABLE TABLE CLAMP — For handling vertically-split core boxes . . . provides fast easy set up . . . lifts off when horizontally-split boxes are blown.

FULL TWO-INCH DRAW — For drawing horizontally-split boxes or one-piece boxes attached to the blower magazine (Model CB5CD.)

SINGLE PUSH-BUTTON CONTROL Fastest operation which completely eliminates error or possibility of error and insures minimum air consumption.

* **STAND OR BENCH** — An individual stand with work apron is available as optional equipment.

*The new low cost CB5C Flexiblo is the most flexible, easiest to operate *bench core blower ever introduced*

Now small jobbing foundry core rooms can have all of the advantages of push-button coreblowing at lowest cost with the new B &P Flexiblo. Push-button control eliminates errors and provides the fastest possible cycle. Minimum air consumption is insured, and a new improved blow valve provides harder, more uniform coreblowing.

Yet, with all of these real "production" features, full jobbing flexibility has been built in. Thus, Flexiblo handles all types of core box equipment and blows either wooden or metal boxes. With the new quick-change blow plate design of the magazine, blow plates may be changed in seconds. The new blow valve, with built-in exhaust, actually agitates the sand in the blower magazine and permits use of a much wider range of core sands.

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part which convection may play in the melting of a metal pile, the article, "Convection and the Heating of Scrap" in the December, 1954 issue of the *Journal of the Iron and Steel Institute* is quite informative, particularly so the conclusions.

Refractory Requirements — While development of the above convection heating is most desirable as a means of fuel cost reduction, it introduces demanding refractory requirements. Among the most important is that the refractory system be completely sealed and pressure tight. This can only be done by using high-temperature cements and mortars—heat setting type preferred—at such points as the skew line, between the roof arches and at and around the throat arch. Even the finest quality fire clay will probably fail in a short time.

The entire system should be tested before running the initial heat and possible leaks plugged, otherwise stinger blows at weak points may destroy adjacent refractories and steelwork. There is no substitute for these high-temperature cements. The lining brick must also be of sufficient refractoriness, as a slight deficiency in temperature tolerance will be aggravated. However, once the refractory system is of proper grade and securely sealed, consecutive heats may be run without complication. Utilizing convection heating to its fullest extent is a "must" for low-cost operation on this type of melting unit.

The unique design and method of stack charging facilitates a full development of convection heating to supplement already present radiation and conduction heating.

All the above items pertaining to burner operation should be studied and properly taken care of before investigating other matters.

The hearth is important in a negative sense. Hearths have a natural tendency to be on the cool side unless this tendency is counteracted by adequate means. Cool hearths will prevent good metal temperature but by simple means hot hearth temperature can be assured. The height of the hearth, its flatness and insulation will do much to prevent coolness if flame impingement is adequate. The hearth should be flat and as high as possible and still provide correct depth for the metal bath. A hearth installed to provide a deep well for the metal bath will tend to run cold. A flat horizontal hearth surface is much more effective. The hearth area is substantial and thus considerable heat units are lost by conduction through the hearth refractory mass. Installation of series 2800 insulating brick buried in the hearth mass will substantially reduce conduction heat losses. One course of this insulation brick below the work surface is very effective in maintaining a hot heat-saturated hearth system.

Slag Critical Factor—The contribution of slag to the operation of this type of furnace is critical not only in regard to metal temperature but also in regard to refractory performance and metal quality. Whenever iron is melted (except in the vacuum process) slag is a by-product. The metallurgical and chemical effects of this slag on metal and refractories must be observed and compensated for to prevent adverse and destructive reactions.

In regard to metal temperature it should be assumed that all slags have an insulating effect and thus tend to depress metal temperature. Slags should be judged as to quantity and quality. If the slag covers more than half of the metal surface after complete meltdown, there is too much slag for quick temperature

Special extra length Thermocouple shown at right. Write for price list.

At left are shown standard Ladle and Furnace type Marshall Thermocouples.

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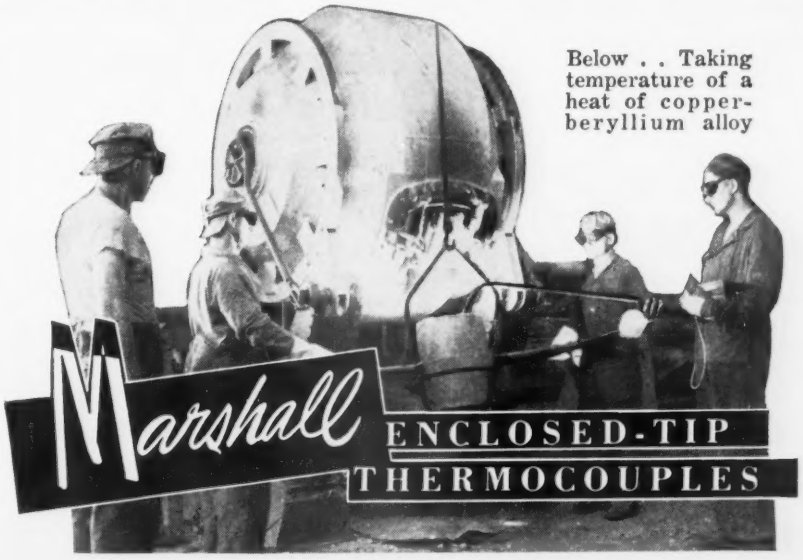

Below . . Taking temperature of a heat of copper-beryllium alloy

pickup. In cases of excessive slag quantity it is best to rod or tapout the surplus through a slag taphole. To do this the slag must be fluid. The melter should check for slag fluidity, adding fluxing agents if necessary, before attempting the slag removal. Slag fluidity should also be good because fluid slags as a rule are better conductors of heat than thick viscous slags. In addition, for repeat production performance the furnace at the end of each heat should be clean and free of all slag, otherwise the slag remaining may complicate following heats. Proper slag fluidity will assist in maintaining a clean furnace. If these simple objectives in working the slag are followed the burners will then do their superheating job effectively.

In any metal temperature improvement campaign it is sheer folly to disregard refractories. The operator must anticipate possible temperature failure of his present refractories and be prepared to use higher refractory materials. At the same time, he must also be prepared to modify slag quality as temperatures increase so as to avoid both refractory destruction by chemical action of the slag and excessive element and metal loss by chemical reactions at the slag-metal interface.

If operators will proceed methodically in a temperature improvement campaign and carefully observe the performance of the burner system, hearth and slag, the blue haze of 2800° to 2850°F metal above the metal stream at the taphole will be obtained with regularity.

NFA To Discuss Effects of Industrial Relations Trends

Program of the coming 57th annual meeting of the National Foundry Association has been patterned to permit foundry management to analyze this year's unusually important trends and developments in industrial relations. The meeting will be held at the Edgewater Beach Hotel, Chicago, Oct. 6-7.

A feature of the program, which includes full-day sessions Thursday and Friday, will be a panel session on "The Effect of the Recent GAW (or SUB) Settlements on the Foundry Industry." It is scheduled for Friday afternoon, and panel members will include: Karlton W. Pierce, Ford Motor Co.; Floyd Lawrence, Detroit editor, *Steel;* Robert L. Schutt, City National Bank & Trust Co., Chicago; Joseph Daoust, Detroit actuary and pension consultant; James I. Poole, Milwaukee labor attorney.

Officers and members of the association's administrative council will meet on Oct. 5 to elect officers for the coming year. Present officers are: President, W. W. C. Ball, vice president, Taylor & Fenn Co., Windsor, Conn.; vice president, Paul L. Arnold, resident manager, U. S. Pipe & Foundry Co., Chattanooga, Tenn.; treasurer, Frank J. Sherwin, president, Chicago Hardware Foundry Co., North Chicago, Ill.; executive secretary, Charles T. Sheehan, Chicago.

The annual NFA Alumni Dinner will be held Wednesday evening. At this dinner, which will be attended by past officers and members of the administrative council, special recognition will be accorded to 26 companies which have been NFA members for over 50 years. Five of these companies—Acme Foundry Corp., Cleveland; Aeromotor Co., Chicago; Erie City Iron Works, Erie, Pa.; Straight Line Foundry & Machine Corp., Syracuse; and Florence Pipe Foundry & Machine Company, Florence, N. J.—have been NFA members since 1898, the year the association was founded.

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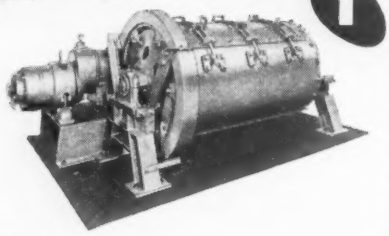

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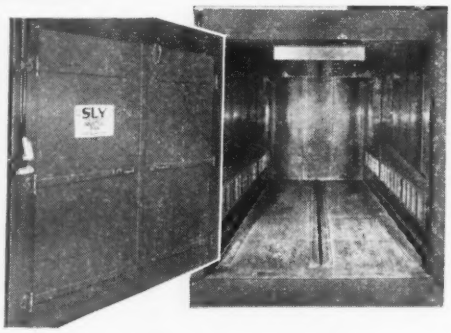
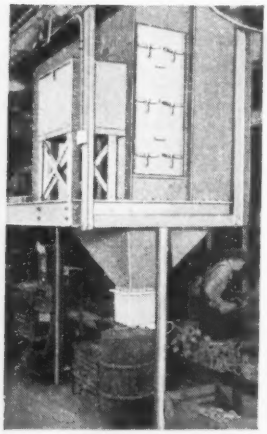
These ovens double production, even triple it in some cases, users say. Cores are better, stronger, less scrap. The efficient handling of heated air in Sly Convectioneered Ovens is the key to their efficiency.





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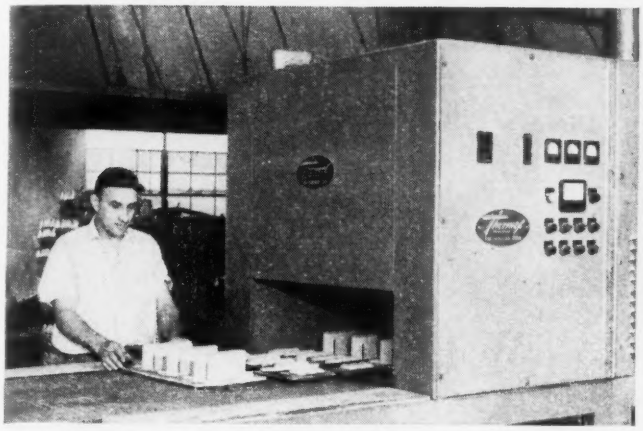
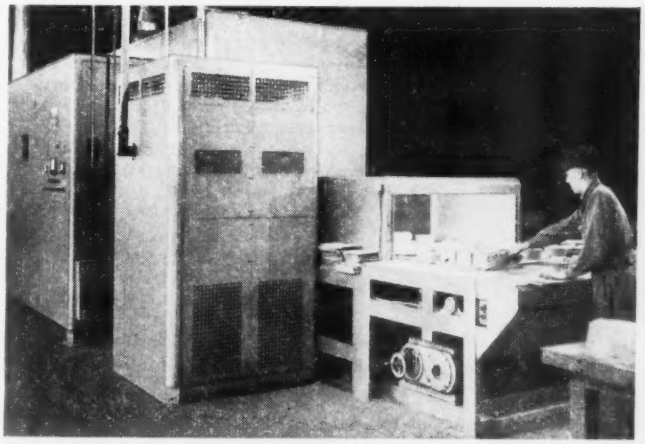


STREAMLINES FLOW! Boose Aluminum Foundry, Reamstown, Pa., has increased coreroom output 33% per manhour. Cores move continuously from maker through their two 15 kw THERMEX units in tandem. No storage required. Minimizes handling. Cores from ½ ounce to over 20 pounds can be baked simultaneously.

PRODUCES BETTER CORES! James B. Clow & Sons reports: Uniform electronic baking eliminates stresses and subsequent surface cracks or dimensional instability. Cores won't sag, don't require reinforcing rods. Surfaces are smoother and harder. Their cores range in size from ½ ounce to 400 pounds.



IMPROVES WORKING CONDITIONS! At Frick Company, Waynesboro, Pennsylvania, a 60 kw THERMEX Core Baking Unit has replaced ovens. Working conditions have been greatly improved . . . no smoke or oven heat. Cores' quality has been improved. Production is faster, more flexible . . . used for about 20,000 different castings.

REQUIRES FEWER DRIERS! At Repcal Brass Manufacturing Company, Los Angeles, a THERMEX Core Baking Unit enables one shift to produce more cores than two shifts with conventional baking equipment. Now, 35 driers produce 4500 cores continuously; formerly, 400 driers produced 1600 cores. Total estimated savings per year: $10,000.

THERMEX—Trade-Mark Reg. U. S. Pat. Off.

CUTS BAKING TIME! James B. Clow & Sons, Coshocton, Ohio, proved the advantages of THERMEX Core Baking Apparatus with a 15 kw unit in the production of soil pipe fittings. Next they purchased two 60 kw units and one 75 kw unit. The resultant streamlined core production netted a reduction of 96% in baking time and 33% in coreroom manhours.

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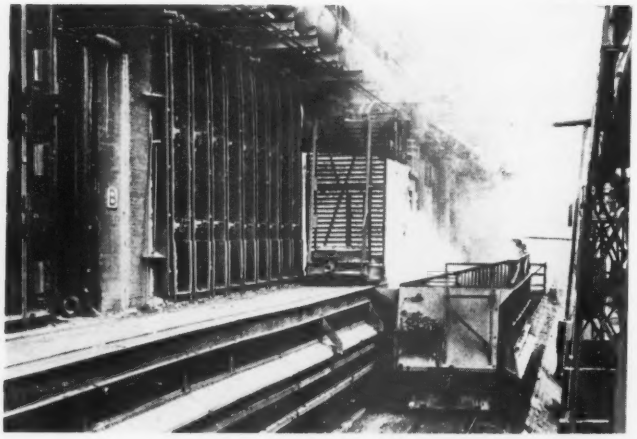
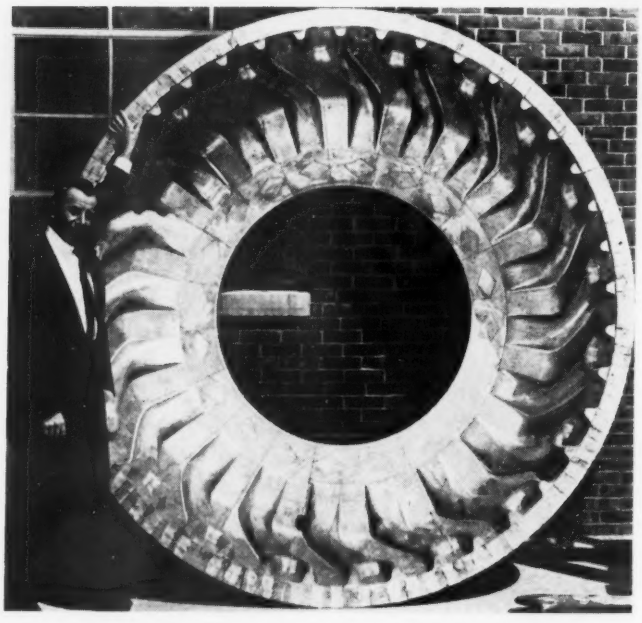
News Views

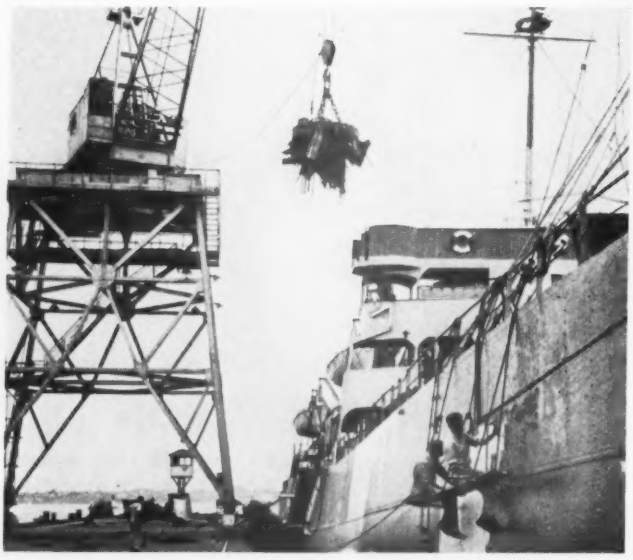
AWARD OF MERIT: Earle M. Layman, director of personnel, Commonwealth Plant, General Steel Castings Co., Granite City, Ill., and his company were recognized recently by the Research Institute of America when they received an Award of Merit. Mr. Layman submitted a prize-winning entry in a national contest and is shown, at far right, with a medallion awarded him for his entry. L. A. Kleber, vice president-manufacturing, displays the plaque awarded the company. Harold P. Dinsmore of the R.I.A., center, presented the awards. See Mr. Layman's prize-winning entry, page 234



MILLIONTH PUSH: A record one-million pushes from a Koppers-Becker combination type coke oven of a battery built in 1929 for the Philadelphia Coke Co., was made recently at its plant in Philadelphia. In continuous operation since installation in January, 1929, the plant includes two batteries of 37 ovens each. At the time of the millionth push, 26 years and 5 months of operation, the total coal carbonized exceeded 17½ million net tons, an average of almost 250,000 tons per oven. The charge of coal for the coking process is slightly over 17 tons per oven, each with a volume of 686 cu ft



HUGE TIRE MOLD: World's largest cast tire mold was shipped recently to Goodyear Tire & Rubber Co., Akron, O., from the Yellow Springs, O., foundry of Morris Bean & Co. Made of aluminum and weighing 1800 lb, this cast tread ring, and its mate, will be used at Goodyear to make 37.5 x 33 tires for use on heavy-duty road building equipment. Morris Bean & Co. make aluminum castings by the Antioch process



SCRAP TRANSFER: Transfer of scrap iron from railroad cars to ocean-going vessels at a New York dock is being handled by a large shipyard crane equipped with an 80-in.-diam. lifting magnet designed and built by Electric Controller & Mfg. Co., Cleveland. Installation of the all-welded magnet, reputedly the world's largest, permits a single crane to do a job that formerly required two independent cranes. Wide swing-travel of the crane and the lifting power of the magnet carry large scrap loads from cars directly to the ship's hold

930 Clearfield in a modern Steel Foundry in Michigan

The CLEARFIELD Mixer *Improves* your continuous sand handling system

Clearfield Mixers mean greater efficiency in sand handling. By efficiency, we mean higher quality sand at a faster production rate, thereby lowering costs. Constant delivery of prepared sand is made possible by Clearfield's short mixing cycle. Clearfield Mixers perform perfectly in the most demanding continuous sand handling system.

For complete details write today for Catalog No. 83. There is a Clearfield Mixer for every sand preparation need.

CLEARFIELD MIXER

the choice of
industrial leaders

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A

Intricate Castings Like this call for Neville Pig Iron

TRACTOR transmission castings like the one shown above have to stand up to years of rugged service. That's why the Lynchburg Foundry Company, Lynchburg, Va., insists upon malleable pig iron that meets rigid specifications for uniform composition and high quality. To meet these requirements, Lynchburg uses *Neville* Pig Iron to cast transmission cases, flywheels, crankcases, oil pans, brake drums and other cast products. ● If your casting requirements are strict, it will pay you to specify *Neville* Pig Iron. Write, wire or phone for more facts today.

NEVILLE

Neville Pig Iron and Neville Coke for the Foundry Trade

W&D 4868

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PITTSBURGH COKE & CHEMICAL CO.

Grant Building · Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Industry BRIEFS

AJAX Engineering Corp., P. O. Box 1418, Trenton 7, N. J., has contracted with Otto Junker G. M. B. H., Lammersdorf, Germany, and Birlec Ltd., Birmingham, England, for development and marketing of a line frequency (60 cycles) coreless induction melting furnace. Furnace is designed to melt gray iron, nodular iron, chips and turnings of ferrous or nonferrous metals and magnesium.

C & S Products Co., has moved to new quarters at 12733 Fullerton, Detroit 27. The company, formerly located at 14841 Meyers Rd., Detroit, manufactures machines used in the blowing of shell cores and shell molds. The new location provides added facilities for manufacturing and experimental work in shell production.

Robert A. Cooley Inc., foundry and machine shop at 185 Broadway, Menands, N. Y., has been granted a charter of incorporation listing capital stock of 150 shares of $100 preferred and 40 shares of no par value. Directors are Robert A. and Elizabeth W. Cooley, 20 Oxford Rd., Albany, N. Y., and Peter E. Noonan, 363 South Main Ave., Albany.

Norton Co., Worcester, Mass., has completed foundations for its new plant in Huntsville, Ala., which will supplement the company's electric furnace facilities in Chippewa, Ont. The plant will include three manufacturing areas totaling 43,000 sq ft and an office area of an additional 4000 sq ft.

Allied Metal Treating Corp., 830 South Fifth St., Milwaukee, has acquired the Wesley Heat Treating Co., Manitowoc, Wis., and the Wesley Metal Treating Co., Spindler Metal Processing Co. and Capitol Heat Treating Co., all of Racine, Wis. Charles I. Wesley is president of the enlarged corporation.

Yale & Towne Mfg. Co., Philadelphia, has appointed two new sales and service representatives—Kimball Industrial Sales Corp., 730 West Indiana Ave., South Bend, Ind., for southern Michigan, northwestern Ohio and northern Indiana; and H. W. Carpenter Co., 4916 North Sheridan, Peoria, Ill., for northeastern Illinois. The company also has opened a new sales and service branch outlet at 4466 Woodward Ave., Detroit, to serve southern Michigan and the Toledo, O., area.

Palmer-Bee Co., Detroit 11, plans relocation and expansion of its manufacturing plant in Hamtramck to Marysville, Mich., where a location containing 30 acres, with frontage on the St. Clair River, has been selected. Remodeling of existing buildings and scheduled new construction are underway to facilitate production of the company's line of conveyor systems and power transmitting machinery.

Clark Equipment Co., Battle Creek 16, Mich., plans establishment of a West Coast plant before the end of the year, in the San Francisco-Bay area. It will be used first as a parts depot and later expanded as an assembly plant for fork lift trucks. Complete stocks of service parts for trucks and straddle carriers, tractor shovels and excavator cranes will be warehoused.

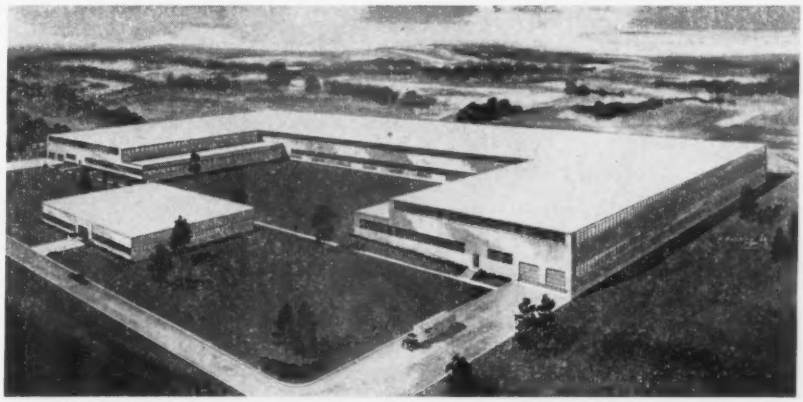
Briggs - Shaffner Co., 500-540 Brookstown Ave., Winston-Salem, N. C., suffered heavy loss Aug. 15 when fire of undetermined origin destroyed the cleaning shed and gutted the main foundry building.

Mercast Corp., an affiliate of Atlas Corp., New York, has completed construction of its new plant at 2620 First St., LaVerne, Calif., for production of frozen mercury process castings. Valued at approximately $500,000, the project provides office, factory and casting room facilities in three separate buildings.

Dravo Corp., Pittsburgh, has started construction of a $400,000 centralized research building adjacent to the company's main plant. When completed the center is expected to have a total staff of 50 research engineers and technicians. W. L. Newhall heads the research and development department.

Frontier Brass & Aluminum Castings Ltd., a new foundry, plans production of nonferrous castings at Port Colborne, Ont. The foundry will be located in buidings purchased from Dwor Metal Co. by E. H. Holzworth, Frontier Bronze Corp., Niagara Falls, N. Y. E. H. Holzworth Jr. will be in charge of the new plant.

Budd Co., 2450 Hunting Park Ave., Philadelphia 32, will manufacture, sell and service the gamma radiography equipment and sources previously produced by the Gamma Corp., Mansfield, Mass. Dr. A. J. Stevens, former president, C. F. Thompson, vice president, and T. W. Healy,



PERMANENT MOLD FOUNDRY: Zollner Machine Works Inc., Ft. Wayne, Ind., has started construction of a permanent mold aluminum foundry that will be completely mechanized to produce truck, industrial and automotive pistons and other diversified products. U-shaped structure will have an 18 ft clear height below trusses that will eliminate all interior columns from the 40,000 sq ft production area. An air-conditioned laboratory and office building, about 80-ft square, will be built next to the foundry

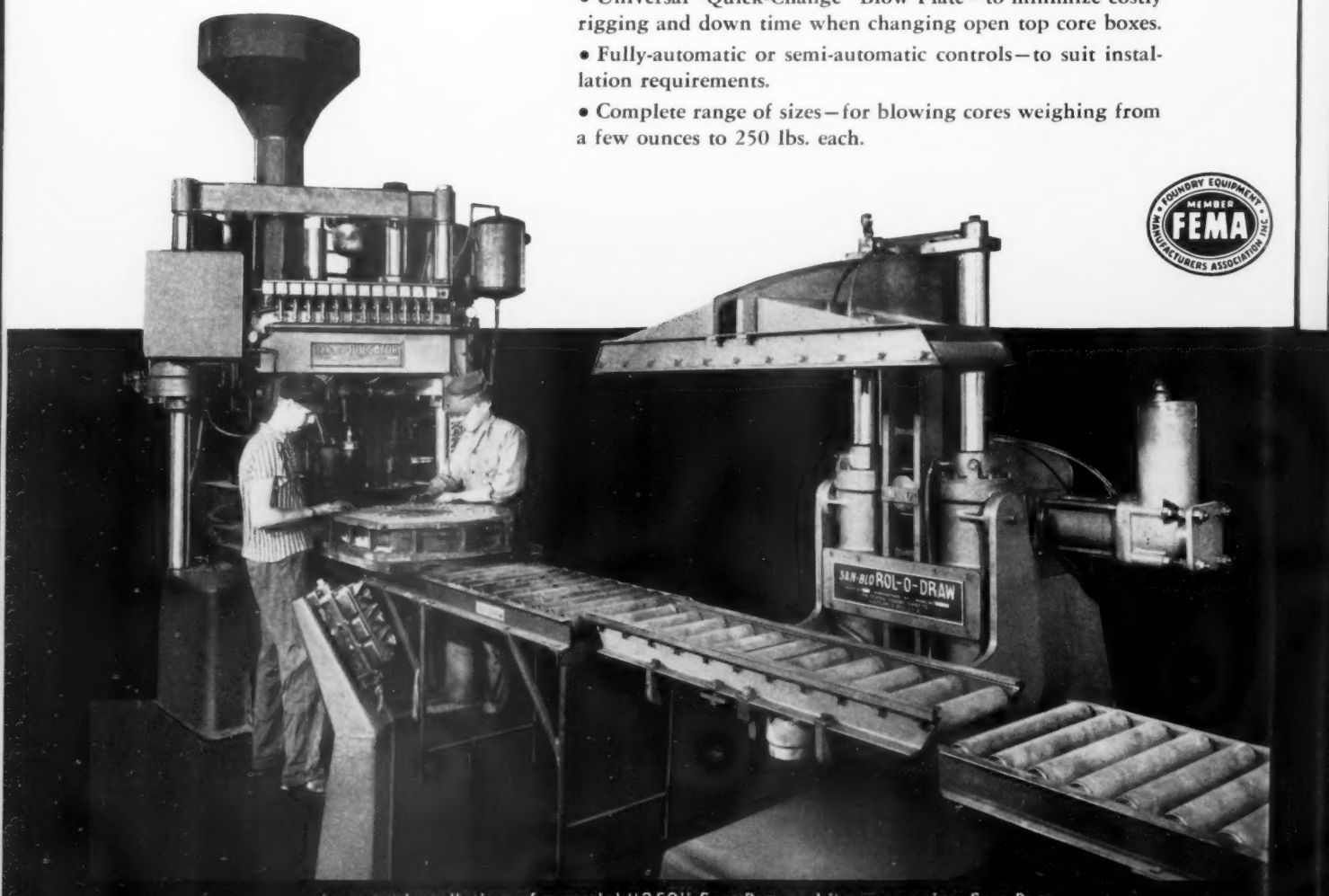
it's SAN-BLO

. . for core making machinery!

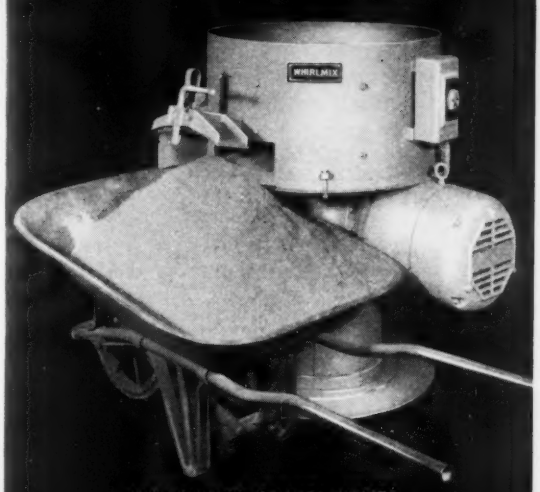
The sensational SAN-BLO core blowers head SAN-BLO's line of core room machinery. These amazingly versatile and efficient core blowers provide the following outstanding features:

- Exclusive sand chamber design, with agitator and aerating blow circuit—for blowing either light or *heavy* sand mixes.
- "Pulsating" blow action—for blowing cores safely in *wooden* as well as metal boxes.
- "LPP" (Low Pressure Prefill)—for holding core box wear to an absolute minimum.
- Universal "Quick-Change" Blow Plate—to minimize costly rigging and down time when changing open top core boxes.
- Fully-automatic or semi-automatic controls—to suit installation requirements.
- Complete range of sizes—for blowing cores weighing from a few ounces to 250 lbs. each.

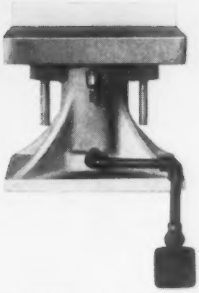
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA



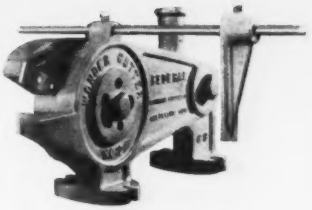
A recent installation of a model "250" SAN-BLO and its companion SAN-BLO ROL-O-DRAW machine for drawing the core box. These two automatic machines form an unbeatable team for the rapid production of large cores.



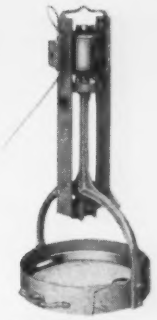
WHIRLMIX SAND MIXER



JOLT MACHINE

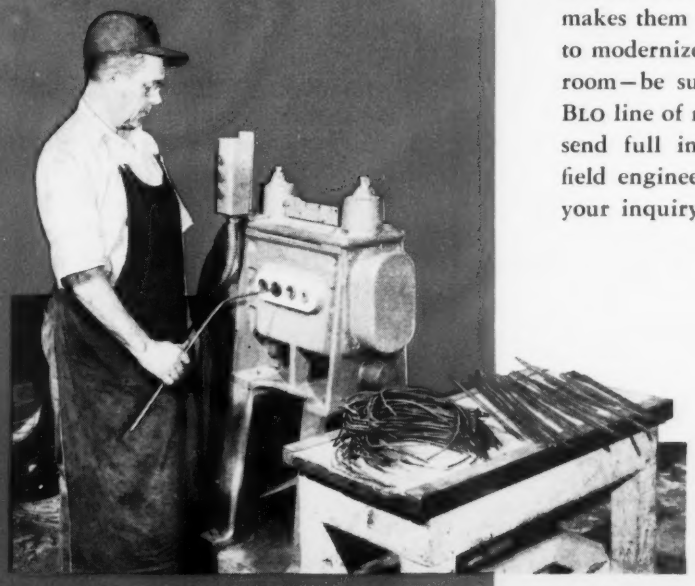


WIRE CUTTER



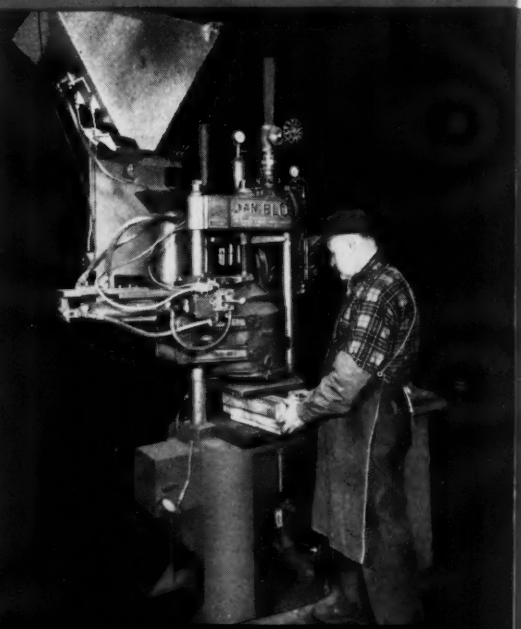
ELECTRIC RIDDLE

In need of supplementary core making machines? SAN-BLO has them—from fast action sand mixers and jolt machines, to wire cutters and straighteners, electric riddles and core drawing machines. It goes without saying that these are all *quality* machines—built for long, trouble-free service—for SAN-BLO makes them that way! If you plan to modernize or expand your core room—be sure to check the SAN-BLO line of machines. We'll gladly send full information or have a field engineer call, in response to your inquiry.



CLIMAX WIRE STRAIGHTENER

VIBRA-DRAW CORE DRAWER



MODEL "40" SAN-BLO CORE BLOWER

San-Blo Division

The FEDERAL FOUNDRY SUPPLY Company

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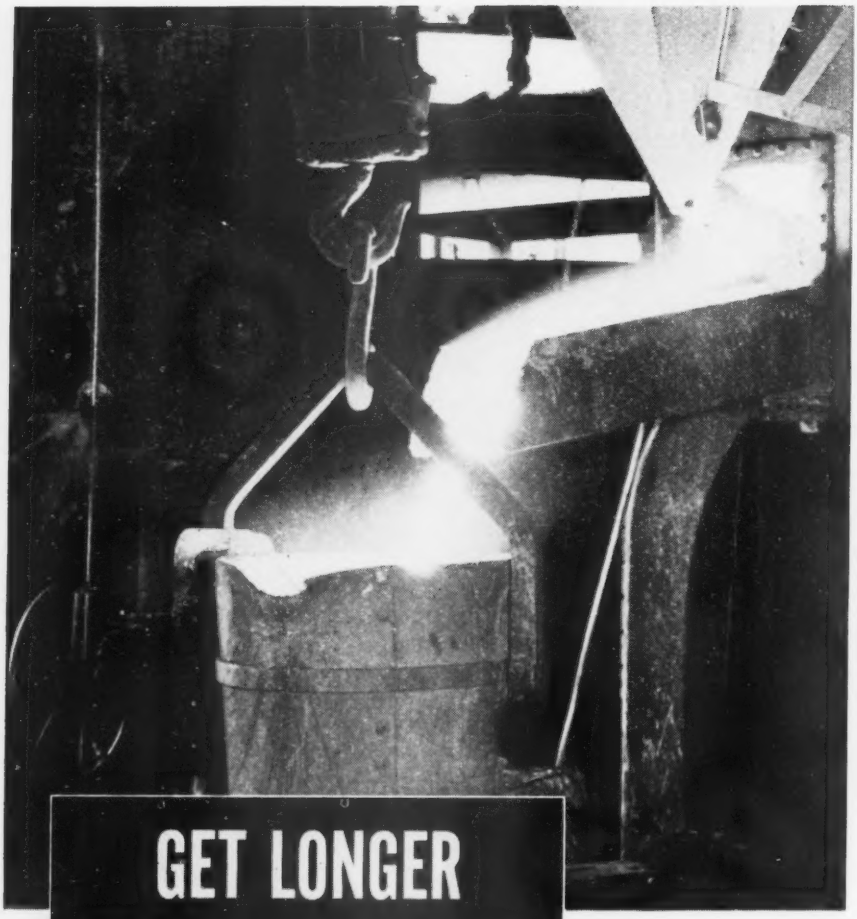


GET LONGER REFRACTORY LIFE

Use this 5-point LACLEDE-CHRISTY MAINTENANCE PLAN

These suggestions help you lower costs by reducing furnace down time and increasing furnace life:

1. Make an on-the-job study of your problems. Let Laclede-Christy engineers consult with your engineers in your plant.
2. Analyze your problems with Laclede-Christy mechanical, combustion and refractory engineers. You receive the benefit of Laclede-Christy experience with similar problems.
3. Get recommendations covering refractory materials best suited to your needs. Get complete instructions on proper application.
4. Make periodic check-ups with your Laclede-Christy Service Engineer. He's available on short notice.
5. Use refractories available from stock in a nearby Laclede-Christy or distributor warehouse—or direct from a Laclede plant. Shipment in most cases two or three days within receipt of order. Call or see your Laclede-Christy representative soon.

LACLEDE-CHRISTY COMPANY

A DIVISION OF H. K. PORTER COMPANY, INC. HKP

DIVISION OF H. K. PORTER COMPANY, INC.

2000 Hampton Avenue • St. Louis 10, Missouri
Mission 7-2400

LACLEDE-CHRISTY COMPANY FOUNDED 1844 Quality First

Inaugurating a new era of service to the industrial heating industry

treasurer, of Gamma Corp. have joined the Budd company and will continue their activities in connection with isotope radiography equipment and other applications of nuclear radiation.

Lewis - Shepard Products Inc., Watertown, Mass., has appointed two sales and service representatives. Nelson L. Hammel, 3730 Tonnelle Ave., North Bergen, N. J., will handle accounts in uptown Manhattan area of New York. George Mauraides, 435 West Bancroft St., Toledo, O., will handle the Toledo area.

Laclede-Christy Co., Division of H. K. Porter Co., St. Louis, has appointed Kenneth S. Patton as sales representative, with headquarters in Oklahoma City, to handle its line of refractories in Oklahoma, northern Texas, western Arkansas and southern Kansas.

International Nickel Co. has moved the Central Atlantic Coast technical field section of its Development and Research Division to 1150 York Rd., Abington, Pa. Section headquarters formerly were at New York. William C. Mearns continues as its head.

Walworth Co. has acquired the Alloy Steel Products Co., Linden, N. J., manufacturer of valves made of stainless steel and other corrosion-resistant alloys. Alloy Steel operates foundries at Bloomfield and Elizabeth, N. J.

Hydraulic & Air Equipment Co., 2316 Northwest Savier St., Portland, Oreg., and 2348 Alki Ave., Seattle, Wash., has been appointed representative for Ross Operating Valve Co., Detroit, in the Washington-Oregon territory.

Winnebago Pattern Works Inc. has been formed in Fond du Lac, Wis., with authorized capital stock of 1250 shares of common of no par value. Incorporation papers were signed by Allan L. Edgarton, 508 Empire Bldg., Fond du Lac.

W. E. Richardson Machine Co., 2421 Second Ave., Birmingham, is handling sales of electric hoists and jib cranes in the Alabama area for R. G. LeTourneau Inc., 2399 South MacArthur, Longview, Tex.

Perlite Institute has moved to larger quarters at 45 West 45th St., New York 36.

What about labor costs for FLASK BUSHING REPLACEMENT?

If you could buy pins and bushings that would hold their accuracy for more hours of rough flask handling—wouldn't it mean a substantial labor saving? Especially if you paid no more for the longer wearing bushing?

We know well how much an accurate, long wearing bushing means to good flask performance. And we assure highest quality in every manufacturing operation, from the selection of the proper steel to the final precision grinding.

Send for our latest catalog which lists the wide range of styles and sizes kept in stock for immediate shipment. We also produce many special pins and bushings which are stocked for the individual users.

Foundrymen know they can depend on Shanafelt for "Everything in Flask Pins and Bushings" as wells as "Everything in Steel Flasks."

Established 1893

THE SHANAFELT MANUFACTURING CO.

2600-2700 WINFIELD WAY N. E. CANTON, OHIO

Bruce Foundry reports on 13 years' operation

"BETTER CASTINGS FROM BETTER CORES WITH CITIES SERVICE CORE OIL"

PRESIDENT WILLIAM J. BRUCE is high in praise for Cities Service Core Oil. Says it prevents premature collapsing, eliminates sticking, permits minimum smoke and offers absolute uniformity. Great in every respect.

Located in Tecumseh, Michigan, Bruce Foundry and Mfg. Co. has a melting capacity of 30 to 40 tons per day. For many years Bruce has turned out top-notch castings for refrigeration and automotive hydraulic equipment.

And for thirteen of those years, Cities Service Core Oil has been a major factor in the quality and rapidity of Bruce's work. Probably no one is better qualified to comment on this oil than President William J. Bruce. Here's what he says: "One of the biggest reasons I can think of for recommending Cities Service Core Oil is its absolute uniformity. This we have discovered in every single order for 13 years. As for foundry performance, I don't think there's a better oil. It has high hot strength preventing premature collapsing, yet collapses rapidly at the right time so that sand doesn't have to be dug out of castings. In addition, it eliminates sticking and permits minimum smoke."

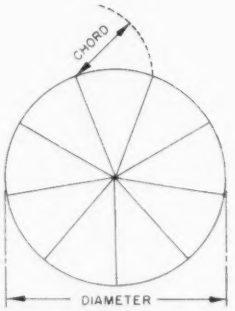
If you'd like to learn more about the oil Mr. Bruce praises so highly, talk to a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

AFTER REMOVAL FROM CORE BOX, sand core gets attention from skilled technician at Bruce Foundry. Firm makes castings for automotive and refrigeration hydraulic equipment, has used Cities Service Core Oil for 13 years.

Lengths of Chords for Dividing Circles Into Equal Parts



If the diameter is in even feet or even inches, the chords can be found directly from the tables below. If the diameter is in feet and inches, add the chord corresponding to the number of even feet to the chord corresponding to the number of even inches in the diameter. For example, find the chord used for spacing the circumference of a circle 6 feet 2 inches in diameter into nine equal spaces.

From table with diameter in feet, chord for 9 spaces, 6 feet ..... = 24.6254
From table with diameter in inches, chord for 9 spaces, 2 inches = .6840

Therefore chord for 6 feet, 2 inches, 9 spaces ..... = 25.3094

The table for additional fractions is used in the same manner. For 6 spaces, the chord is equal to the radius.

Length of Chord When Diameter is

No. of spaces	1 ft.	2 ft.	3 ft.	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
3	10.3923	20.7846	31.1769	41.5692	51.9615	62.3538	72.7461	83.1384	93.5307	103.9230
4	8.4853	16.9706	25.4558	33.9411	42.4264	50.9117	59.3970	67.8822	76.3675	84.8528
5	7.0534	14.1068	21.1603	28.2137	35.2671	42.3205	49.3740	56.4274	63.4808	70.5342
7	5.2066	10.4132	15.6198	20.8264	26.0330	31.2396	36.4462	41.6528	46.8594	52.0660
8	4.5922	9.1844	13.7766	18.3688	22.9610	27.5532	32.1454	36.7376	41.3298	45.9220
9	4.1042	8.2085	12.3127	16.4170	20.5212	24.6254	28.7297	32.8339	36.9382	41.0424

Length of Chord When Diameter is

No. of spaces	1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.
3	.8660	1.7321	2.5981	3.4641	4.3301	5.1962	6.0622	6.9282	7.7942	8.6603	9.5263
4	.7071	1.4142	2.1213	2.8284	3.5355	4.2426	4.9497	5.6569	6.3640	7.0711	7.7782
5	.5878	1.1756	1.7634	2.3511	2.9389	3.5267	4.1145	4.7023	5.2901	5.8779	6.4656
7	.4339	.8678	1.3017	1.7355	2.1694	2.6033	3.0372	3.4711	3.9050	4.3388	4.7727
8	.3827	.7654	1.1481	1.5307	1.9134	2.2961	2.6788	3.0615	3.4442	3.8268	4.2095
9	.3420	.6840	1.0261	1.3681	1.7101	2.0521	2.3941	2.7362	3.1782	3.4202	3.7622

Length of Chord To Be Added for Each Additional Fraction of

No. of spaces	1/8 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.
3	.1083	.2165	.3248	.4330	.5413	.6495	.7578
4	.0884	.1768	.2652	.3536	.4419	.5303	.6187
5	.0735	.1469	.2204	.2939	.3674	.4408	.5143
7	.0542	.1085	.1627	.2169	.2712	.3254	.3796
8	.0478	.0957	.1435	.1913	.2392	.2870	.3348
9	.0427	.0855	.1283	.1710	.2138	.2565	.2993

Length of Chord When Diameter is

No. of spaces	1 ft.	2 ft.	3 ft.	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
11	3.3808	6.7616	10.1424	13.5232	16.9040	20.2847	23.6655	27.0463	30.4271	33.8079
12	3.1058	6.2117	9.3175	12.4233	15.5291	18.6350	21.7408	24.8466	27.9525	31.0583
13	2.8718	5.7436	8.6154	11.4872	14.3589	17.2307	20.1025	22.9743	25.8461	28.7179
14	2.7602	5.3405	8.0107	10.6810	13.3512	16.0215	18.6917	21.3620	24.0322	26.7025
15	2.4949	4.9899	7.4848	9.9798	12.4747	14.9696	17.4646	19.9595	22.4545	24.9494
16	2.3411	4.6822	7.0233	9.3643	11.7054	14.0465	16.3876	18.7287	21.0698	23.4108
17	2.2050	4.4100	6.6150	8.8200	11.0250	13.2300	15.4350	17.6400	19.8449	22.0499
18	2.0838	4.1676	6.2513	8.3351	10.4189	12.5027	14.5864	16.6702	18.7540	20.8378
19	1.9751	3.9503	5.9254	7.9005	9.8757	11.8508	13.8259	15.8011	17.7762	19.7513
20	1.8772	3.7544	5.6316	7.5089	9.3861	11.2633	13.1405	15.0177	16.8949	18.7721
21	1.7885	3.5770	5.3655	7.1540	8.9425	10.7310	12.5195	14.3081	16.0966	17.8851
22	1.7078	3.4156	5.1233	6.8311	8.5389	10.2467	11.9544	13.6622	15.3700	17.0778
23	1.6340	3.2680	4.9020	6.5360	8.1700	9.8040	11.4380	13.0720	14.7060	16.3400
24	1.5663	3.1326	4.6989	6.2653	7.8316	9.3979	10.9642	12.5305	14.0968	15.6631
25	1.5040	3.0080	4.5120	6.0160	7.5200	9.0240	10.5280	12.0320	13.5360	15.0400

Length of Chord When Diameter is

No. of spaces	1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.
10	.3090	.6170	.9271	1.2361	1.5451	1.8541	2.1631	2.4721	2.7812	3.0902	3.9992
11	.2817	.5635	.8452	1.1269	1.4087	1.6904	1.9721	2.3539	2.6356	2.8173	3.0991
12	.2588	.5176	.7765	1.0353	1.2941	1.5529	1.8117	2.0706	2.3294	2.5882	2.8470
13	.2393	.4786	.7179	.9573	1.1966	1.4359	1.6752	1.9145	2.1538	2.3932	2.6325
14	.2225	.4450	.6676	.8901	1.1126	1.3351	1.5576	1.7802	2.0027	2.2252	2.4477
15	.2079	.4158	.6237	.8316	1.0396	1.2475	1.4554	1.6633	1.8712	2.0791	2.2870
16	.1951	.3902	.5853	.7804	.9755	1.1705	1.3656	1.5607	1.7558	1.9509	2.1460
17	.1837	.3675	.5512	.7350	.9187	1.1025	1.2862	1.4700	1.6537	1.8375	2.0212
18	.1736	.3473	.5209	.6946	.8682	1.0419	1.2155	1.3892	1.5628	1.7365	1.9101
19	.1646	.3292	.4938	.6584	.8230	.9876	1.1522	1.3168	1.4814	1.6459	1.8105
20	.1564	.3129	.4693	.6257	.7822	.9386	1.0950	1.2515	1.4079	1.5643	1.7208
21	.1490	.2981	.4471	.5962	.7452	.8943	1.0433	1.1923	1.3414	1.4904	1.6395
22	.1423	.2846	.4269	.5693	.7116	.8539	.9962	1.1385	1.2808	1.4231	1.5655
23	.1362	.2723	.4085	.5447	.6808	.8170	.9532	1.0893	1.2255	1.3617	1.4978
24	.1305	.2611	.3916	.5221	.6526	.7832	.9137	1.0442	1.1747	1.3053	1.4358
25	.1253	.2507	.3760	.5013	.6267	.7520	.8773	1.0027	1.1280	1.2533	1.3787

Length of Chord To Be Added for Each Additional Fraction of

No. of spaces	1/8 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.
10	.0386	.0773	.1159	.1545	.1931	.2318	.2704
11	.0352	.0704	.1056	.1409	.1761	.2113	.2465
12	.0323	.0657	.0981	.1294	.1618	.1941	.2265
13	.0299	.0598	.0897	.1197	.1496	.1795	.2094
14	.0278	.0556	.0834	.1113	.1391	.1669	.1947
15	.0260	.0520	.0780	.1040	.1299	.1559	.1819
16	.0244	.0488	.0732	.0975	.1219	.1463	.1707
17	.0229	.0459	.0689	.0919	.1148	.1378	.1608

Length of Chord To Be Added for Each Additional Fraction of

No. of spaces	1/8 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.
18	.0217	.0434	.0651	.0868	.1085	.1302	.1519
19	.0206	.0411	.0617	.0823	.1029	.1234	.1440
20	.0196	.0391	.0587	.0782	.0978	.1173	.1369
21	.0186	.0373	.0559	.0745	.0932	.1118	.1304
22	.0177	.0356	.0534	.0712	.0889	.1067	.1245
23	.0170	.0340	.0511	.0681	.0851	.1021	.1191
24	.0163	.0326	.0489	.0653	.0816	.0979	.1142
25	.0157	.0313	.0470	.0627	.0783	.0940	.1097

Lengths of Chords for Dividing Circles Into Equal Parts

Length of Chord When Diameter is

No. of spaces	1 ft.	2 ft.	3 ft.	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
26	1.4464	2.8929	4.3393	5.7858	7.2322	8.6785	10.1250	11.5714	13.0179	14.4643
27	1.3931	2.7862	4.1793	5.5725	6.9656	8 3587	9.7518	11.1449	12.5380	13.9311
28	1.3435	2.6871	4.0307	5.3743	6.7179	8.0614	9.4050	10.7486	12.0922	13.4357
29	1.2974	2.5949	3.8923	5.1897	6.4871	7.7846	9.0820	10.3794	11.6768	12.9742
30	1.2543	2.5087	3.7630	5.0174	6.2717	7.5260	8.7804	10.0347	11.2891	12.5434
31	1.2140	2.4280	3.6421	4.8561	6.0701	7.2841	8.4981	9.7122	10.9262	12.1402
32	1.1762	2.3524	3.5286	4.7048	5.8810	7.0572	8.2334	9.4096	10.5858	11.7621
33	1.1407	2.2813	3.4220	4.5627	5.7034	6.8440	7.9847	9.1254	10.0660	11.4067
34	1.1072	2.2144	3 3217	4.4289	5.5361	6.6433	7.7505	8.8578	9.9650	11.0722
35	1.0757	2.1513	3.2270	4.3027	5 3784	6.4540	7.5297	8.6054	9.6810	10.7567
36	1.0459	2.0917	3.1376	4.1835	5.2293	6.2752	7.3211	8.3669	9.4128	10.4587
37	1.0177	2.0353	3.0530	4.0707	5.0883	6.1060	7.1237	8.1414	9.1590	10.1767
38	.9910	1.9819	2.9729	3.9638	4.9548	5 9457	6.9367	7.9276	8.9186	9.9095
39	.9656	1.9312	2.8968	3.8624	4.8280	5.7936	6.7592	7.7248	8.6904	9.6560
40	.9415	1.8830	2.8245	3.7660	4.7075	5.6491	6 5906	7.5321	8.4736	9.4151
41	.9186	1.8372	2.7558	3.6744	4.5930	5.5115	6.4301	7.3487	8.2673	9.1859

Length of Chord When Diameter is

No. of spaces	1 ft.	2 ft.	3 ft.	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
42	.8968	1.7935	2.6903	3.5870	4.4838	5.3806	6.2773	7.1741	8.0709	8.9676
43	.8759	1.7519	2.6278	3.5038	4.3797	5.2557	6.1316	7.0075	7.8835	8.7594
44	.8561	1.7121	2.5682	3.4243	4.2803	5.1364	5.9925	6.8486	7.7046	8.5607
45	.8371	1.6742	2.5112	3 3483	4.1854	5.0225	5.8595	6.6966	7.5337	8.3708
46	.8189	1.6378	2.4567	3 2756	4.0945	4.9134	5.7324	6 5513	7.3702	8.1891
47	.8015	1.6030	2.4045	3 2060	4.0076	4.8091	5 6106	6 4121	7.2136	8.0151
48	.7848	1.5697	2 3545	3.1393	3.9242	4.7090	5.4939	6.2787	7.0635	7.8484
49	.7688	1.5377	2.3065	3 0754	3.8442	4.6131	5.3819	6.1507	6.9196	7.6884
50	.7535	1.5070	2.2605	3 0139	3.7674	4.5209	5.2744	6.0279	6.7814	7.5349
51	.7387	1.4774	2.2162	2 9549	3 6937	4.4324	5.1711	5 9098	6.6486	7.3873
52	.7245	1.4491	2.1736	2.8982	3.6227	4.3472	5.0718	5.7963	6 5209	7.2454
53	.7109	1.4218	2.1327	2 8435	3 5544	4.2653	4.9762	5.6871	6.3980	7.1089
54	.6977	1.3955	2.0932	2.7910	3.4887	4.1864	4.8842	5.5819	6.2796	6.9774
55	.6851	1.3701	2.0552	2.7403	3.4253	4.1104	4.7955	5.4805	6.1656	6.8507
56	.6728	1.3457	2.0185	2.6914	3.3642	4.0731	4.7099	5.3828	6.0556	6.7284
57	.6611	1.3221	1.9382	2.6442	3.3053	3.9663	4.6274	5.2884	5.9495	6.6105

Length of Chord When Diameter is

No. of spaces	1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.
26	.1205	.2411	.3616	.4821	.6027	.7232	.8438	.9643	1.0848	1.2054	1.3259
27	.1161	.2322	.3483	.4644	.5805	.6966	.8127	.9287	1.0448	1.1609	1.2770
28	.1120	.2239	.3359	.4480	.5598	.6718	.7838	.8957	1.0077	1.1196	1.2316
29	.1081	.2162	.3244	.4324	.5406	.6487	.7568	.8650	.9731	1.0812	1.1893
30	.1045	.2091	.3136	.4181	.5226	.6272	.7317	.8362	.9408	1.0453	1.1498
31	.1012	.2023	.3035	.4047	.5058	.6070	.7082	.8093	.9105	1.0117	1.1129
32	.0980	.1960	.2941	.3921	.4901	.5881	.6861	.7841	.8822	.9802	1.0782
33	.0951	.1901	.2852	.3802	.4753	.5703	.6654	.7604	.8555	.9506	1.0456
34	.0923	.1845	.2768	.3691	.4613	.5536	.6459	.7381	.8304	.9227	1.0150
35	.0896	.1793	.2689	.3586	.4482	.5378	.6275	.7171	.8068	.8964	.9860
36	.0872	.1743	.2615	.3486	.4358	.5229	.6101	.6972	.7844	.8716	.9587
37	.0848	.1696	.2544	.3392	.4240	.5088	.5936	.6784	.7633	.8181	.9329
38	.0826	.1651	.2477	.3303	.4129	.4955	.5781	.6606	.7432	.8258	.9084
39	.0805	.1609	.2414	.3219	.4023	.4828	.5633	.6437	.7242	.8047	.8851
40	.0785	.1569	.2354	.3138	.3923	.4708	.5492	.6277	.7061	.7846	.8631
41	.0765	.1531	.2296	.3062	.3827	.4593	.5358	.6124	.6889	.7655	.8420

Length of Chord When Diameter is

No. of spaces	1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.
42	.0747	.1495	.2242	.2989	.3736	.4484	.5231	.5978	.6726	.7473	.8220
43	.0730	.1460	.2190	.2920	.3650	.4380	.5110	.5840	.6570	.7300	.8029
44	.0713	.1427	.2140	.2854	.3567	.4280	.4993	.5707	.6421	.7134	.7847
45	.0698	.1395	.2093	.2790	.3488	.4185	.4883	.5581	.6278	.6976	.7673
46	.0682	.1365	.2047	.2730	.3412	.4095	.4777	.5459	.6142	.6824	.7507
47	.0668	.1336	.2004	.2672	.3340	.4008	.4675	.5343	.6011	.6679	.7347
48	.0654	.1308	.1962	.2616	.3270	.3924	.4578	.5232	.5886	.6540	.7194
49	.0641	.1281	.1922	.2563	.3204	.3844	.4485	.5126	.5766	.6407	.7048
50	.0628	.1256	.1884	.2512	.3140	.3767	.4395	.5023	.5651	.6279	.6907
51	.0616	.1231	.1847	.2462	.3078	.3694	.4309	.4925	.5540	.6156	.6772
52	.0604	.1208	.1811	.2415	.3019	.3623	.4226	.4830	.5434	.6038	.6642
53	.0592	.1184	.1777	.2370	.2962	.3554	.4147	.4739	.5332	.5924	.6516
54	.0581	.1163	.1744	.2326	.2907	.3489	.4070	.4652	.5233	.5814	.6396
55	.0571	.1142	.1713	.2281	.2854	.3425	.3996	.4567	.5138	.5709	.6280
56	.0561	.1121	.1682	.2243	.2804	.3361	.3925	.4486	.5046	.5607	.6168
57	.0551	.1102	.1653	.2204	.2754	.3305	.3856	.4407	.4958	.5509	.6060

Length of Chord To Be Added for Each Additional Fraction of

No. of spaces	1/8 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.
26	.0151	.0301	.0452	.0603	.0753	.0904	.1055
27	.0144	.0288	.0432	.0575	.0719	.0863	.1007
28	.0140	.0280	.0420	.0560	.0700	.0840	.0980
29	.0135	.0270	.0405	.0541	.0676	.0811	.0946
30	.0131	.0261	.0392	.0523	.0653	.0784	.0915
31	.0126	.0253	.0379	.0506	.0632	.0759	.0885
32	.0123	.0245	.0368	.0490	.0613	.0735	.0858
33	.0119	.0238	.0356	.0475	.0594	.0713	.0832

Length of Chord To Be Added for Each Additional Fraction of

No. of spaces	1/8 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.
34	.0115	.0231	.0346	.0461	.0577	.0692	.0807
35	.0112	.0224	.0336	.0448	.0560	.0672	.0784
36	.0109	.0218	.0327	.0436	.0545	.0654	.0763
37	.0106	.0212	.0318	.0424	.0532	.0636	.0742
38	.0103	.0206	.0310	.0413	.0516	.0619	.0723
39	.0101	.0201	.0302	.0402	.0503	.0603	.0704
40	.0098	.0196	.0294	.0392	.0190	.0588	.0687
41	.0096	.0191	.0287	.0383	.0478	.0574	.0670

Length of Chord To Be Added for Each Additional Fraction of

No. of spaces	1/8 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.
42	.0093	.0187	.0280	.0374	.0467	.0560	.0654
43	.0091	.0182	.0274	.0365	.0456	.0547	.0639
44	.0089	.0178	.0268	.0357	.0446	.0535	.0624
45	.0087	.0174	.0262	.0349	.0436	.0523	.0610
46	.0085	.0171	.0256	.0341	.0427	.0512	.0597
47	.0083	.0167	.0250	.0334	.0417	.0501	.0584
48	.0082	.0164	.0245	.0327	.0409	.0191	.0572
49	.0080	.0160	.0240	.0320	.0400	.0481	.0561

Length of Chord To Be Added for Each Additional Fraction of

No. of spaces	1/8 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.
50	.0078	.0157	.0235	.0314	.0392	.0471	.0549
51	.0077	.0154	.0231	.0308	.0385	.0462	.0539
52	.0075	.0151	.0226	.0302	.0377	.0153	.0528
53	.0074	.0148	.0222	.0296	.0370	.0444	.0518
54	.0073	.0145	.0218	.0291	.0363	.0436	.0509
55	.0071	.0143	.0214	.0285	.0357	.0428	.0500
56	.0070	.0140	.0210	.0280	.0350	.0421	.0491
57	.0069	.0138	.0207	.0275	.0344	.0413	.0482

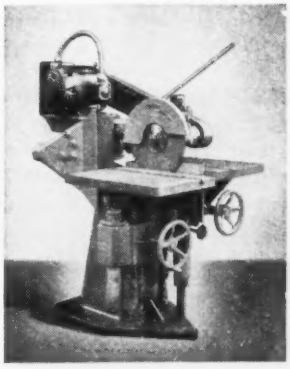
It's the low-cost producer who builds the "better mousetrap"

THE low-cost producer doesn't worry about competition. He knows that in today's tough competitive castings market, it's the low-cost producer who builds the better mousetrap . . . who finds that business beats a path to his door only when he produces a *better* casting *faster,* at *lower* unit cost.

The formula for doing this is quite simple:

- A close look at manufacturing costs often shows that foundry equipment isn't producing as it should.
- A close look at low-investment modern Tabor foundry machines often shows how easily production can be increased by simple step-by-step mechanization.

A Tabor engineer will be glad to discuss this with you—without obligation. Or write for our catalog.



Tabor-Brasive Cut-Off Machine
Type C10AF, 10 hp. One of many sizes from 5 up to 20 hp. Split table design, with movable head capable of handling work height up to 46". This unit drops cutting time as much as 90% over sawing or chipping. It saves metal, reduces snagging, gives excellent cut surfaces. And it's backed by over 70 years of Tabor foundry experience.

Flask Lift Machines • Squeezers and Jar Squeezers
Jarring Machines • Rollover Machines
Abrasive Cut-Off Machines • Vibrators

The TABOR TRADE 1880 MARK Manufacturing Co.
Division of
TURBO MACHINE COMPANY
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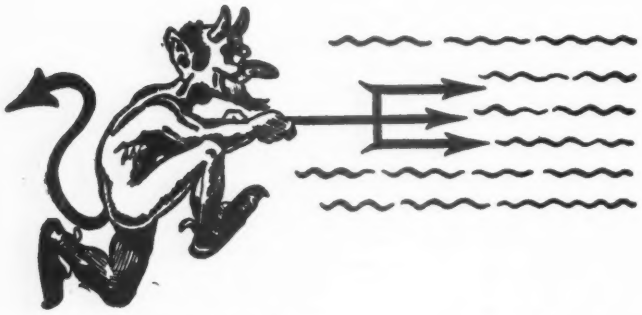
Produce More Castings Per Heat with



Soffel's THERMOTOMIC® "HOTOP" LIQUIDIZER

Exothermic Carbon Free Liquidizer For Iron, Steel, Nodular Iron

This new head compound saves feeding metal in risers or feeding heads which can now be reduced in height 40 to 70%

SOFFEL'S THERMOTOMIC "HOTOP" CARBON FREE LIQUIDIZER is different from other head compounds in that "HOTOP LIQUIDIZER does NOT contain powdered metal, is NOT a thermit compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorus and can be used without danger of contamination on any ferrous metal or alloy.

"HOTOP" LIQUIDIZER also saves molding time as less sand is needed in the mold cope due to short height of risers. "HOTOP" LIQUIDIZER produces a liquid slag well over 4000° F. of heat and insulates the metal. The feeding metal will remain liquid at least 50% longer assuring adequate feeding while the casting cools and solidifies. Piping and shrink cavities caused by premature freezing of the feeding metal are eliminated.

THERMOTOMIC HOTOP LIQUIDIZER BRAND "B" SHOULD BE USED ON RISERS UNDER 4 INCHES IN DIAMETER

GUARANTEED TO PRODUCE SOLID CLEAN CASTINGS

SOFFEL'S FAMOUS *Carbon Free* LIQUIDIZER FOR ALL METALS and ALLOYS

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on both ferrous and non-ferrous metals and also in ingot production. It is the original scientific non-carbon, exothermic compound for feeding heads and risers.

When applied on the heads or risers, CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. It actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding heads will be eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft refractory insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads or risers.

SOFFEL'S THERMOTOMIC COMPOUND

PATENTED

FOR ALL METALS and ALLOYS

THERMOTOMIC COMPOUND is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings.

This permits easy removal of the casting feeding heads and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing mixing with molding sand in the mold, heat at thin metal sections is retained until the thick main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength. For use in green sand molds, use THERMOTOMIC W. P. (Waterproofed)

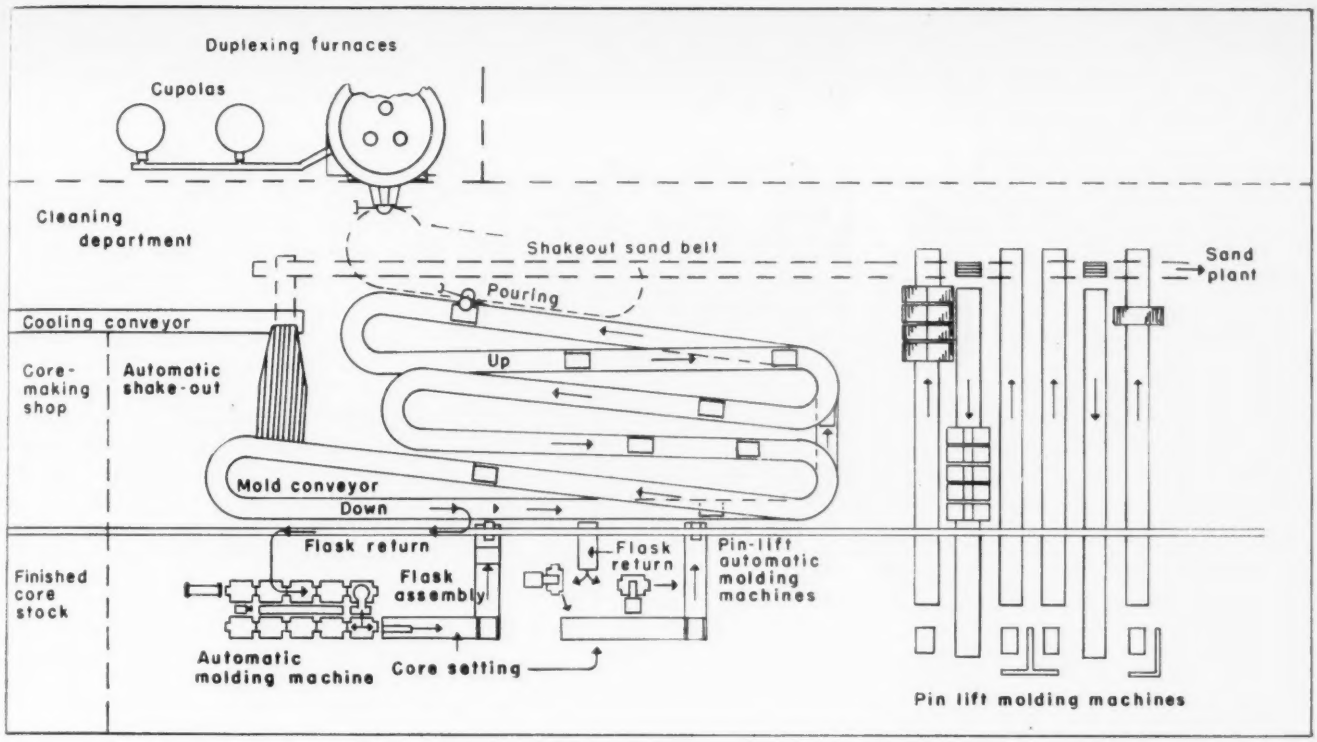
NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO. 5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

U. S. Patents No. 2,490,327 and No. 2,500,097

PITTSBURGH METALS PURIFYING COMPANY

1352 MARVISTA ST., N. S. PITTSBURGH 12, PA.

WORLD'S LARGEST MANUFACTURER OF FLUXES AND PURIFIERS FOR ALL METALS AND ALLOYS



This automatic unit produces about 1500 tons of malleable castings yearly at the Aduceverk foundry in Sandnes, Norway. Duplex melting is employed

Norwegians Apply Automation To Low-Tonnage Shops

By LESTER B. KNIGHT
Lester B. Knight & Associates
Chicago

THE author spent several months recently working with Stavenger Steel Works of Norway as part of a project to increase productivity in Norwegian industry. The stay in Norway provided the opportunity to visit several other plants, including some foundries. Two of the outstanding foundries are Aduceverk at Sandnes and Jotul at Oslo.

Jotul is a manufacturer of stoves, lavatories (porcelain enameled) and soil pipe fittings. It produces approximately 5000 tons per year in a foundry which not only is highly mechanized, but also is automated to a fair degree. This plant is on the side of a valley with a river running through part of the plant. There are four levels, and materials handling is a problem, to say the least. To describe the foundry operation briefly—raw material is brought in on the highest plant level, which is approximately level with the cupola charging door. Charges are made up by hand and dumped from cars into the charging door. The cupola is equipped with a recuperative type hot blast; it operates at approximately 1000° F, and thus no silicon is lost during melting. Coke is approximately 9 per cent.

Most of the molding is on a mechanized unit consisting of two cope and two drag machines, each pair of machines having one operator. In operation, flasks are returned from the shakeout and automatically placed on a table from which it is automatically indexed onto the mold-

Flask filling station. Note patterns in frames at right, ready to be located in line

ing machine table. The operator has previously blown off the pattern and pushed a button to start the cycle. Sand automatically drops into the flask and the operator levels it. Five air rammers, mounted ingeniously, move simultaneously across the mold and back to the original position. The mold is struck off automatically, pushed off the pattern and indexed to an automatic rollover device.

In the meantime, the operator has been cleaning the other pattern and initiating the cycle.

The drags, after rollover, are cored and the copes automatically closed as the drags are moved into position. The closed mold then is placed on the powered mold conveyor—also automatically.

The speed of the mold conveyor is limited by the physical limitations of the building—and the cooling time required—therefore the production from the molding machines is limited. Machine capacity is greater than 150 molds per hour—but actual production cannot exceed 80. Even so, this is extremely high production per manhour. A composite pattern is utilized because requirements of any one casting are limited. Virtually all of this special equipment has been designed and built by their own men.

By far the most interesting plant was the malleable foundry at Aduceverk, Sandnes, managed by Ivar Mathisen. He was formerly manager of Jotul and I believe initiated many of the automatic and semi-automatic operations I have described.

At Aduceverk, he has a unique problem and unique solution. Total production is approximately 1500 tons of castings per year of 275 working days. This includes all sorts of castings from chain links to pipe and electrical fittings, agricultural implements and other usual malleable castings found in the U. S.

Automatic closing of a mold

Foundry equipment includes approximately four double molding machines making cope and drag simultaneously, each operated by two men, producing approximately 70 molds per hour. There also are an automatic mechanized unit—with one cope and one drag machine—powered mold conveyor, automatic shakeout and a cupola-electric duplex melting unit melting at the rate of approximately 2½ tons per hour. The cupola is equipped with hot blast.

Several illustrations of the installation are shown here. Briefly, a steel frame was developed in which are mounted the equivalent of two 13 x 18 in. pattern plates. There may be several different castings in one frame because quantities required are small. The frame (with patterns inserted) is moved automatically into position, where the flask is placed, automatically. Frame and flask are moved to position 2 where sand is added, and the mold is jolted and squeezed in position 3. It is struck off as it moves into position 4 where it is rolled over and the pattern lifted from the mold, then returned automatically in the upside down position through a brush-off and blow-off area to another position where it is rolled over and placed in position 1 ready to receive a flask. The operation is such that if sufficient molds have been made from any frame, it may be removed and another frame inserted without delaying the cycle.

There are two machines—one for drags and one for copes. Cores are placed manually, although they could be set into jigs and booked automatically.

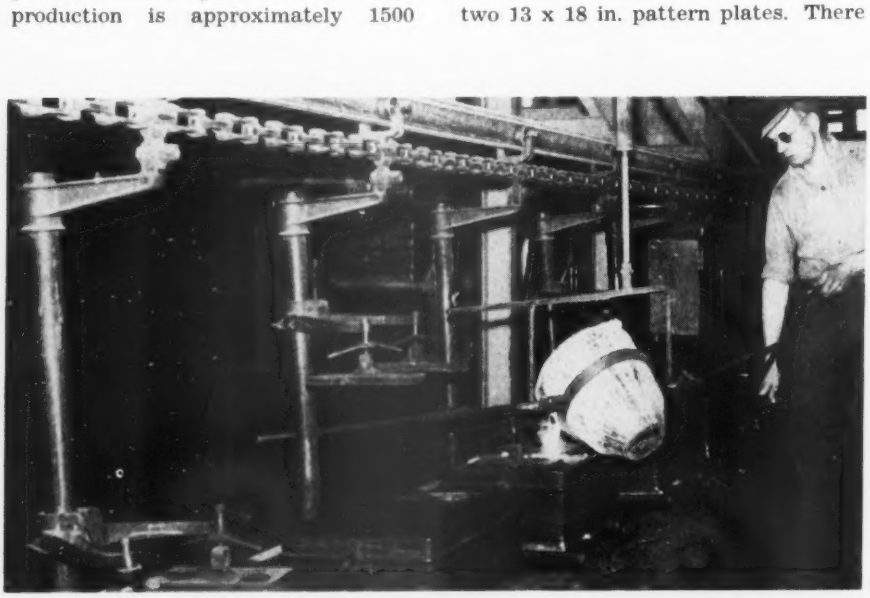
After the molds are closed, they are placed on a suspended tray type of conveyor which operates at three levels. This permits a very compact layout. A mold clamping device is a part of each tray and eliminates the need for weights. One man pours all the conveyor molds. After cooling, molds are dumped automatically onto a vibrating shakeout and flasks replaced on the mold conveyor to be returned to the flask placing station. There are no bars in the flasks.

Castings are discharged from the shakeout onto a cooling conveyor where they are sprued and delivered to an airless blast machine after rough sorting. After cleaning, castings are inspected and packed directly into boxes for batch electric annealing.

Production is at the rate of approximately 180 molds per hour and maximum production could be approximately 300 molds per hour (each mold is equivalent to two 13 x 18 in. molds).

It looks as though this type of setup might be applied in the States for both malleable and gray iron. It is not unlike in principle a unit we have developed for brass plumbing goods.

Water-cooled Cupola — Another very interesting trip before I arrived in Norway took me to the rebuilt Frederick Krupp gray iron foundry at Essen, Germany. Here I saw a cupola that has not had the bottom dropped for nine months. It is water-cooled, unlined except in the melting zone where a rammed



Pouring molds at the Aduceverk foundry conveyor line. A mold clamping device is a part of each tray, eliminating the need for weights

shell molding

cuts machining and polishing —IN HALF!

Identical motor end-frames of gray iron showing advantages of shell molding over green sand casting. Shell molded frame on left needs only finish reaming in center hole and precision boring on large diameter. Rough and semi-finishing operations have been eliminated at both points—all polishing has been eliminated. Resulting in: lower cost per piece, greater production, less rejects.

Many cast parts can be used as they emerge from shakeout; others require only minimum finishing (see photo). They're smoother—free from surface gas holes...they're sounder—have more uniform grain structure. Plenco phenolic shell-molding resins form light dimensionally accurate molds, and are adaptable for most metals, even hard-to-cast metals like ductile iron. Molds made of Plenco resins are extremely durable—they can be stored indefinitely for future use, are easily moved from one location to another. Whatever you are now casting in sand—whether it's brass plumbing fittings or high strength automatic transmission parts—it can be produced faster and at lower cost by shell molding with Plenco phenolic shell-molding resins. For better cast products investigate shell molding with Plenco resins—today!

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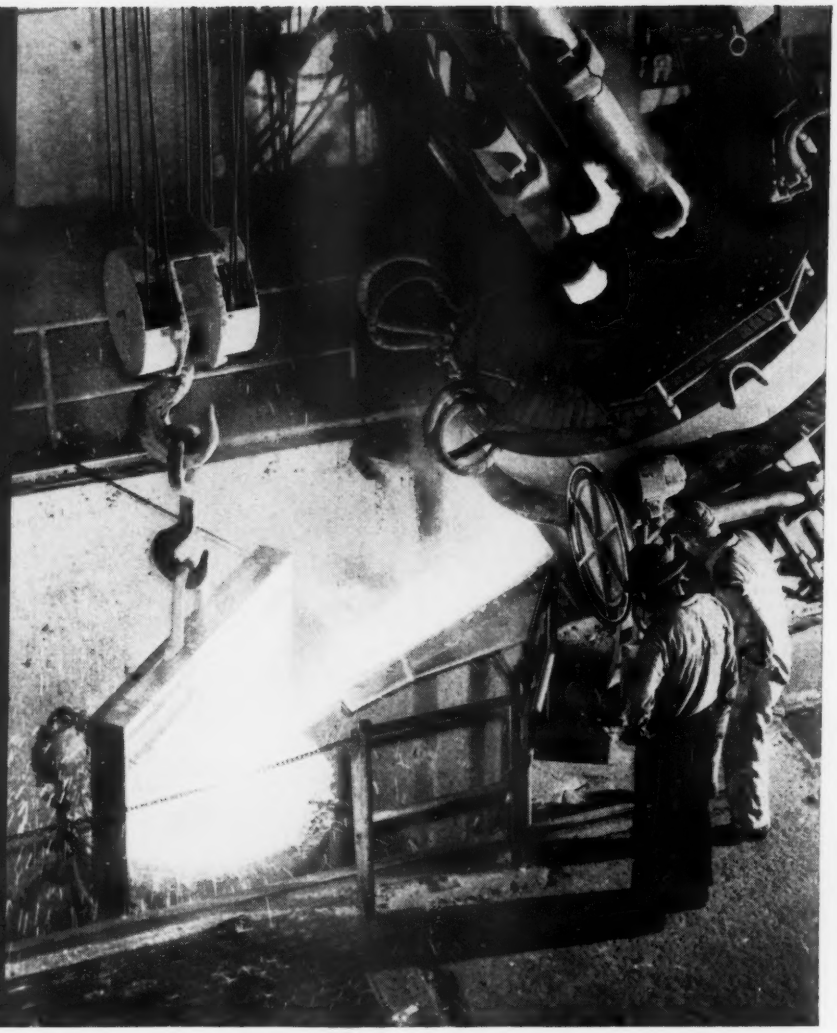

CQT Lectromelt Furnace in the Oakland, California, foundry of General Metals Corporation.

Quality is emphasized by this quarter-century-old West Coast producer in offering steel and iron castings to the trade. This assurance of quality is made possible by the close control of metals possible in their two Lectromelt Furnaces; a Type NT and a CQT.

Precise control of melting conditions is inherent in Lectromelt equipment. With these furnaces, temperatures and chemical analyses can be held to close specifications. Products run uniformly better and costs are lower. Couple these advantages with the versatility of Lectromelt Furnaces and you'll understand why they are so popular with foundrymen.

Catalog 9-A describes Lectromelt Furnaces. For a free copy, write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in ... GERMANY: Friedrich Kocks GMBH, Dusseldorf ... ENGLAND: Birlec, Ltd., Birmingham ... FRANCE: Stein et Roubaix, Paris ... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege ... SPAIN: General Electrica Espanola, Bilbao ... ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

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graphite lining is used; it has water-cooled tuyeres and is used ten hours a day—banked for the night and restarted in the morning.

It is usually operated with a basic slag but can be operated with an acid slag. It has a recuperative type hot blast, which provides blast air at 500° C. Coke consumption is 9 per cent, and mostly inexpensive steel and iron scrap is used to produce two grades of iron. Whether the metal can be used for general machinery castings, without duplexing, still remains to be proved. Krupp, of course, is barred from installing an electric furnace but they expect within a year to work out techniques to secure a satisfactory grade of iron directly from the cupola. The present iron is largely used for ingot molds, etc., and heavy machinery castings such as columns for large milling machines. Such a cupola perhaps has application in our pipe industry. Under normal conditions, the metal cost at the spout is substantially less than conventional cupola melting.

Offers Infrared Bibliography

A 374-page bibliography on infrared radiation and its applications has been published by the Office of Technical Services, U. S. Department of Commerce. Compiled by the Library of Congress under Office of Naval Research contract, the bibliography includes all references to published literature on the subject, from 1935 to 1951, which could be found.

The classification proceeds from infrared theory and general infrared-optical properties through the various elements and components of infrared equipment and infrared spectroscopy and photography to its applications.

Entitled *Infrared: A Library of Congress Bibliography* and designated PB 111643, the volume may be ordered from OTS, U. S. Dept. of Commerce, Washington 25, D. C., for $3.

Sponsors Cleaner Air Week

Cleaner Air Week is being sponsored Oct. 23-29 by the Air Pollution Control Association. Its purpose is to call attention to accomplishments which have been made in reducing air contamination and to promote a united educational program for cleaner air. Members of the APCA include technical experts from federal, state and municipal governments, large industrial organizations and individual companies.

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These exclusive features make the new Hydro-Filter virtually self cleaning...can make maintenance a matter of minutes a month:
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. . . lifts out. Works at slow speed for top dewatering action.
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Ease of maintenance and constant efficiency go hand in hand with the new Hydro-Filter to give you your money's worth in constant service at rated capacity.
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Subsidiary of National Engineering Company, Manufacturer of Simpson Mix-Mullers.

they know it in England,

Adopting many American foundry practices and mechanical aids, Rice & Co., Ltd., a jobbing foundry in Northampton, England, has obtained a considerable increase in efficiency. H. B. Farmer, works manager and a member of the English Productivity Team which visited American Foundries, has this to say in his Productivity Report: "The most outstanding feature in the production of light castings is the almost invariable use of snap and taper flasks in both machine and hand-molding operations. The "pop-off" flask is probably the most highly developed flask of this type."

(Photo shows a Hines "POP-OFF" flask and jacket in use in the Rice & Co. plant.)

Photo courtesy of MODERN CASTINGS

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Around the Country

NEWS REPORTS FROM

Chicago . . . Detroit . . . Los Angeles . . . Philadelphia

Detroit— New car time is here and showings of 1956 models are popping up here and around the country like champagne bubbles. With the exception of the Lincoln, appearances of cars shown so far to the press are changed but little. Lincoln's body changes are extensive and include a wrap-around windshield; a 7-in. longer, 2½-in. lower, 2-in. wider body; new front and rear treatments; changed side chrome trim and an engine which is upped to 285 hp.

In the Chrysler line of cars, styling changes are not quite so marked. Rather high rising tail fins sloping gradually downward toward the front of the car, give it a nosed-down appearance. Stylists have been successful in catching the lines of modern aircraft and applying them to their cars. Grill treatments and side and rear chrome trim are changed. Horsepower on all models is increased. Chrysler Corp.'s automatic transmisions now are pushbutton controlled, with added ease and safety of operation claimed. The buttons are located to the extreme left of the instrument panel within easy reach of the driver. Among the many optional pieces of equipment offered for the cars is a Hi-Fi record player for those car riders who don't like the immediate radio programs.

Continuing its trend in recent years, Chrysler again has increased the use of aluminum and magnesium castings in its cars. Average weight per car in the 1956 models is about 90 lb.

Ford Motor Co.'s Ford line, just recently offered to the public, follows the trend of minor body changes and engines of increased horsepower. The Thunderbird engine is used in Ford's top series, giving 202 hp with automatic drive and 200 hp with the standard and overdrive transmissions. Improved steel alloy, precision molded exhaust valves and camshafts contribute to improved engine performance.

All makes of cars are stressing features for increased safety. Door latches which keep doors closed in severe accidents and rollovers perhaps are the outstanding features. Safety seat belts like those in aircraft are offered. New headlights provide improved night visibility. Brakes have been improved and body and chassis members strengthened.

On the foundry front, the rumored expansion and re-equipping of the Ford Dearborn Iron Foundry is only rumor. It actually amounts to reactivating an existing molding line which has been inoperative for about a year. Putting the line back into production will supply a greater flow of castings to satisfy the requirements of Ford's new engine plant at Lima, O.

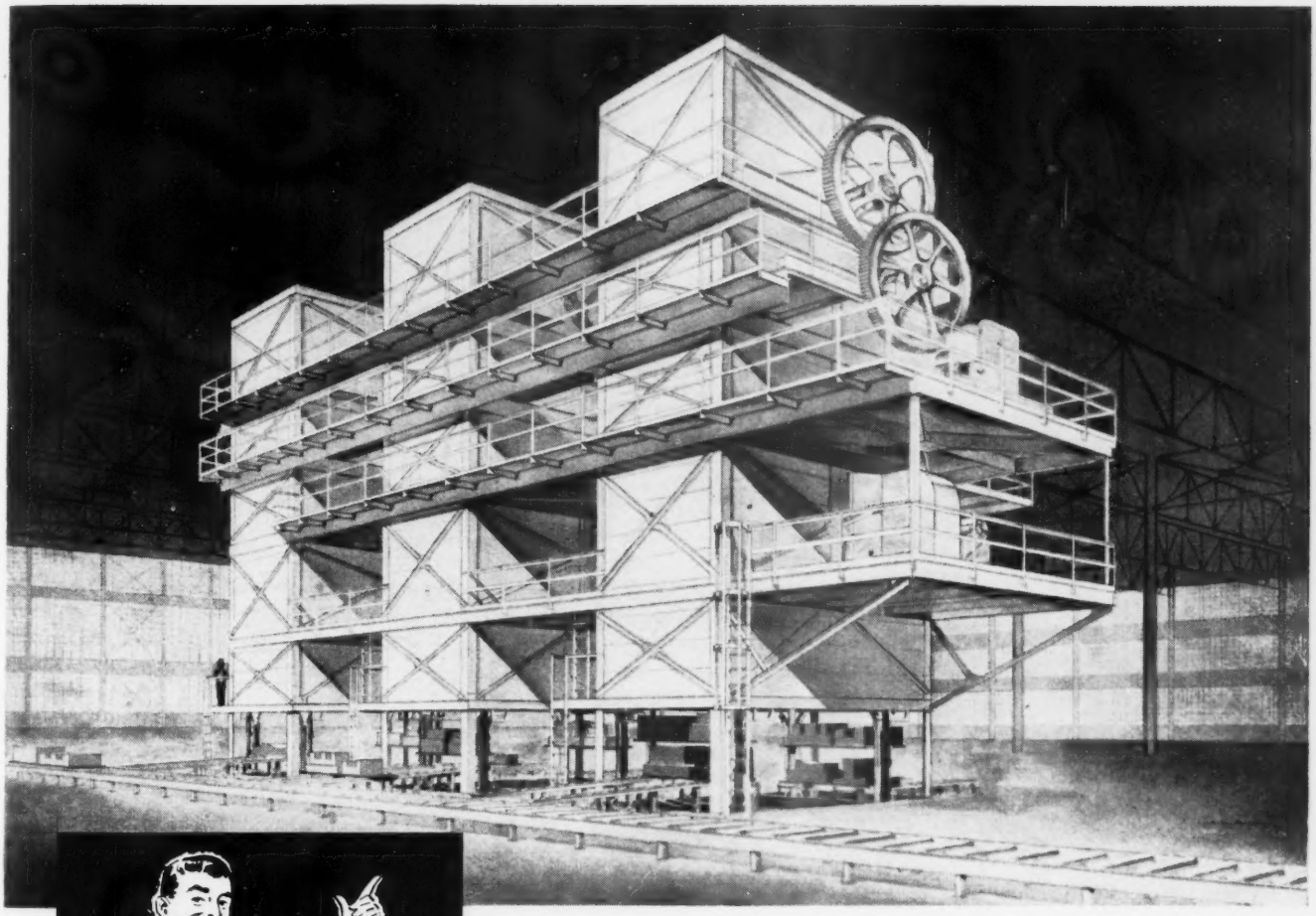
SAFETY FIRST: The highest award of the National Safety Council was given recently to the Dearborn, Mich., iron foundry of the Ford Motor Co. John W. Schneider, left, foundry manager, shares the award plaque with Nick Rollo, oldest seniority employee in the Dearborn foundry, who has been with Ford since 1911. The award recognizes a safety record significantly better than that of the gray iron industry as a whole and represents a marked reduction in accident frequency and severity at Dearborn

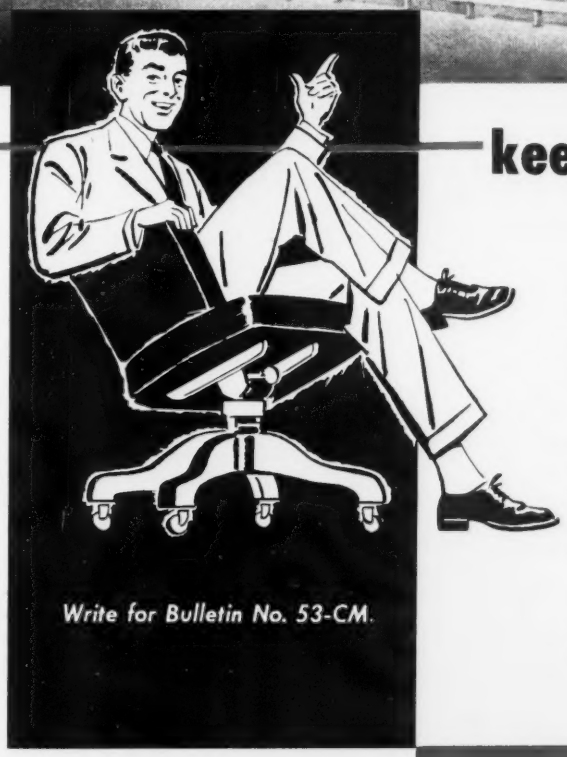
Los Angeles— Foundrymen in this district are now convinced that they will enter 1956 with backlogs stretching as long as eight weeks in most cases. Failure of the usual summer slump to materialize, plus increased fall activity, has caused most steel foundries to push operations well in excess of 100 per cent of capacity.

Even summer vacation shutdowns and letdowns failed to completely turn the tide of stampeding orders. Said one foundryman, "We just can't handle all the business that's coming our way."

About the only factor that has slowed the rising tide of foundry activity was a record hot spell that swept the area for more than a week. During this period some shops reduced actual melting but made up the slack when the heat wave subsided.

The usual year-end pickup in construction activity has placed requirements in the forefront of foundry business. Demand for railroad castings has also quickened, but in general the increasing demand covers





Write for Bulletin No. 53-CM.

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In August and early September, Los Angeles' Vernon industrial district underwent more than ten smog alerts, with politicians and the press again badgering local foundries. When questioned on the smog problem, one foundryman said, "I don't know why they continue to make scapegoats of the foundries. The industry has spent millions to combat the problem, but this is never publicized."

Chicago—Foundrymen who visited General Motors' "World's Fair of Power" on Chicago's lakefront last month found their professional interest rewarded on two scores. First was the satisfaction that castings occupy a prominent place in the production and use of industrial and aircraft power and second was the operating foundry exhibit of the Fabricast Division of GM.

Occupying over 4000 sq ft in Powerama, the Fabricast exhibit was casting aluminum crankcase inspection covers which the Electro-Motive Division uses on the engines of diesel-electric locomotives. The covers were made in a permanent mold machine, the aluminum being melted in an electric furnace. Pouring was by hand ladles, although in-plant production pouring is done mechanically.

After being removed from the molds, the castings were trimmed in dies and dressed on belt grinders.

In its 26-day stand, Powerama attracted about 2 million visitors. The three-day Labor Day holiday netted an attendance of 433,303, the Sunday total being the peak day with 173,559.

* * *

United States Steel Corp. on Aug. 17-18 marked the 75th anniversary of its South Works which sprawls across 574 acres and 2 miles of Lake Michigan's shore line in South Chicago. During that week this plant, the oldest steel mill in Chicago and third largest in the world, poured its 140 millionth ton of steel.

The diamond anniversary of this plant carries interest to foundrymen as well as steelmakers, for almost from the start it has operated a gray iron foundry. In the 1881-1954 period, foundry production has totaled 9.5 million tons. Annual output of this strictly captive shop has grown to nearly half a million tons to include 325,000 tons of ingot molds, 127,000 tons of mold stools and 7000 tons of miscellaneous iron castings. These products accommodate the needs of the newer and larger Gary Works as well as South Works.

Before 1900, the foundry was put in its own building which, in addition to cupola facilities, contained a single open hearth for production of steel for rolls and ingots. Electric furnace steel of both carbon and alloy grades was first produced in 1909 in a 15-ton arc furnace located in the foundry. During World War I a second electric furnace was installed in the foundry. After the war, the foundry electric furnaces, as well as the single open hearth, terminated operation.

* * *

In Ford Motor Co.'s ninth annual national Industrial Arts Awards competition, James J. Konkel, 18, of 2212 S. 30th St., Milwaukee, won an outstanding achievement award and $100 first place award for an L-P cylinder head pattern. The project took the youth four months to complete at the Boys Technical High School, where he was enrolled in the senior patternmaking course. Walter H. Wutke was his teacher. His pattern was entered in the patternmaking and molding classification. Konkel and his teacher were recipients of a three-day expense-paid trip to Detroit and Dearborn.

Raymond Brunke, 17, of 2506 S. 59th Court, Cicero, Ill., was winner of $60 third place award in the same classification for coreboxes for a drill press base. He is a student at J. Sterling Morton High School.

New York—Gray iron operations are improving seasonally, but are still far from brisk and are lagging behind those in certain adjacent districts. Schedules average a shade less than five days a week, it appears, and while some jobbing shops are quoting deliveries in three to four weeks, buyers are having no difficulty in obtaining less on the general run of castings.

Malleable shop activities reflect well sustained demand for fittings and a definitely improved inquiry from the railroads. Delivery promises range five to six weeks, with operations at around 100 per cent of normal. Brass and bronze shops are doing fairly well, with a pickup in maritime work, both Navy and commercial. Cast aluminum production is well sustained with possibly 70 per cent of over-all output going into aircraft and radar work, according to some trade estimates. Requirements for oil burners, washing machines and other household appliances are holding up.

"And what were you arguing about this time?"

Raw material prices are generally higher. This applies not only to ferrous and nonferrous scrap and some ferroalloys, but also to oven foundry coke, which went up $1 a ton in August to $25.50 at Kearney, N. J., and also similarly at other points along the eastern seaboard. Pig iron prices are firm at the higher prices announced in July. Meanwhile, rumors persist that producers of brass and bronze ingots will "one of these days" start quoting on a basis of price in effect at time of shipment. Present policy is to quote firm prices on shipments up to 60 days.

Sperry Gyroscope division, Sperry-Rand Corp., plans to liquidate its nonferrous foundry at Great Neck, Long Island, by Jan. 1. It has been producing brass, bronze, aluminum and magnesium castings.

Pittsburgh—Foundries returning to production after vacation shutdowns found a fairly good volume of work awaiting them. Orders from automakers are continuing strong, and there's a steady demand for mill equipment from overworked steel mills. Mills have remained at or near capacity operations this summer with little chance for maintenance.

Pig iron sales to foundries are not indicative of business conditions. Local foundries bought abnormally large amounts before the price increase last June. Then vacation slowdowns cut July and August requirements. Now sales are rising again, and the outlook is for a good fourth quarter.

Despite a generally favorable outlook, one prominent foundryman in Pittsburgh warned recently that smoke control requirements in Allegheny County may prevent the Pittsburgh district from receiving new foundry capacity in the future. Foundries are being asked to install smoke control equipment now. The expense may have the effect of discouraging foundries from building in the Pittsburgh area, a local found-

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ry president has predicted.

United Engineering & Foundry Co., Pittsburgh, reports rapid progress in its $8 million program of expansion and improvement announced previously. Enlargement of its steel foundry at Vandergrift, Pa., is one of the main features of company plans. United is also investing in new machine tools.

Foundry plans call for increase in productive capacity by addition of a 50-ton furnace and extra annealing and molding capacity at Vandergrift. Second purpose of the foundry expansion is to enable United to manufacture 200-ton castings, a field of increasing demand and limited capacity, company officials report.

Further foundry plans call for improvements in cleaning of castings. United expects to complete this project by December.

Philadelphia— Casting demand is good. This applies to all of the major categories—gray iron, malleable, steel and nonferrous. Business held up better than expected throughout the summer months and is heading upward as the fall season gets under way.

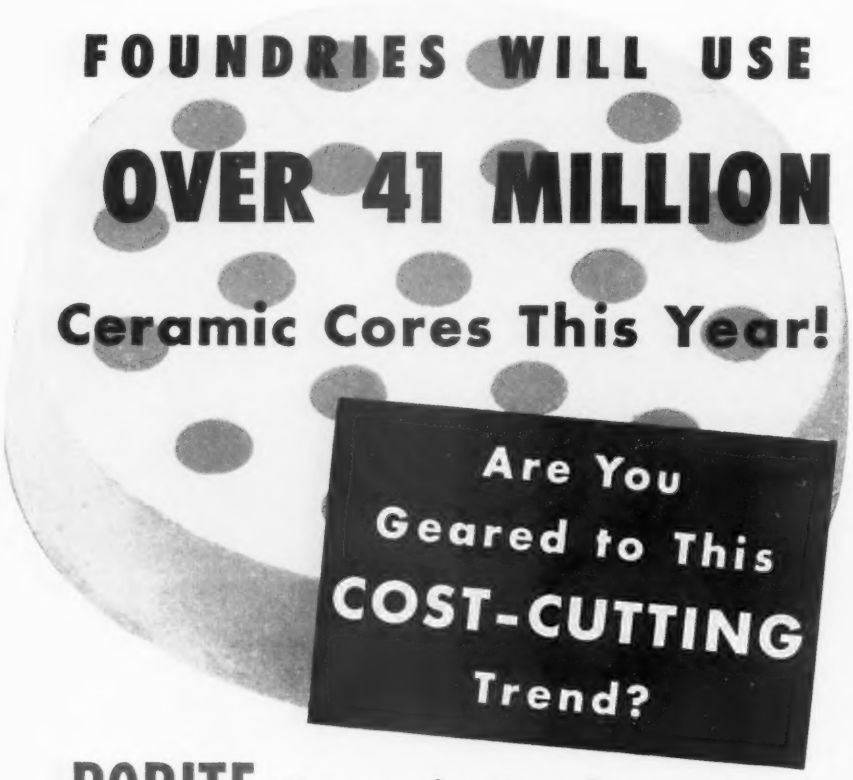
While various construction requirements still lead, at least in a relative sense, gray iron shops report a good diversified demand. Agricultural and textile requirements are off, but needs of petroleum equipment, papermaking machinery, power transmission, material handling equipment, stokers, general machinery and various other categories are at the best level since last spring.

Most gray iron shops are booked three or four weeks ahead, and in some cases as much as five. This is on the basis of as high an operating level as has been reported this year. Most shops are operating five days a week; several six days. Newspapers are carrying more ads for molders than in some time.

Steel foundries are promising six weeks' delivery on the basis of a five-day working week. Most malleable shops are booked up several weeks ahead on a similar basis. Stepping up in railroad equipment requirements is a feature of the malleable market here.

Most nonferrous shops are working five days a week with full working forces. Maritime needs are greater; also there is a growing demand for transformers and controls. Meter manufacturers are still specifying freely.

Prices on foundry coke were advanced $1 a ton by producers here, at Camden, N. J., and Swedeland, Pa., to $25, ovens. Cast iron scrap market is buoyant, as well as that for nonferrous raw materials.



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Porite ceramic strainer cores are rapidly replacing sand strainer cores in efficient foundries everywhere. Records show... that for results obtained... ceramic strainer cores cost far less than sand strainer cores. Porite ceramic cores *will* reduce casting rejects ... provide cleaner castings ... while saving you money. Porite cores will not spall, erode or disintegrate during pouring—may be stored indefinitely.

Gear your foundry to this cost-cutting change! Make this free test... tell us the size and quantities of sand cores you now use—or send samples, and we will send you *free* Porite cores from our huge stocks of standard sizes. Write today.

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Material Handling Clinics Start Fall Travel Circuits

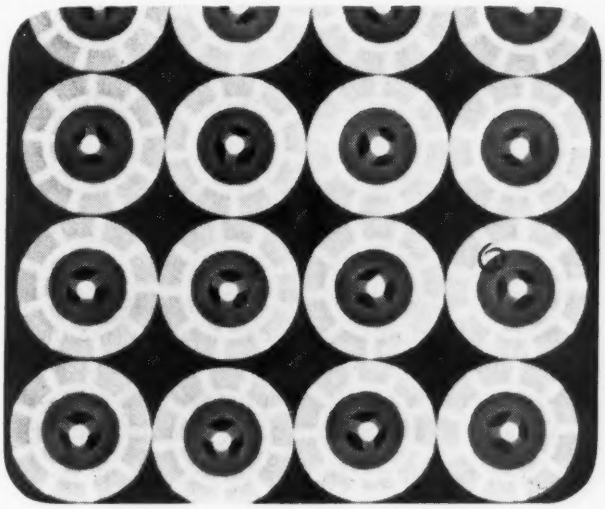
First of the 1955 fall traveling clinics developed by the Material Handling Institute, Pittsburgh, will be held at Cleveland Hotel in Cleveland Oct. 18. The program is being sponsored by the Cleveland chapters of the American Material Handling Society and the Society for Advancement of Management.

On Oct. 19 the clinic travels to the Brown Hotel in Louisville to participate in a similar program sponsored by the Falls Cities chapter of the AMHS.

Twenty-five management men from MHI member companies are panel members for these full day conferences. Those attending the clinic may present their company's material handling problems for discussion and suggestion by the panel and other conferees.

SPINS LIKE "BLAZES"—

so Radiography checks each one



Radiograph of oil scavenger rotor in variable displacement pump for aircraft hydraulic systems.

"BLAZES" is not the word—but suggests the maker's shorter expression for the rate at which this rotor spins. Fact is, rpms are so high that the soundness of the casting is important in terms of safety as well as serviceability.

So radiography goes to work and plays its unique part. With no damage to the product, radiography looks inside the part and checks each rotor's structure. Only flawless parts will meet the strict requirements of service.

Proving soundness with x-rays has become common practice with more and more suppliers of quality castings. They know it helps build reputations for delivering only good work.

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Employee Carelessness Causes Accidents

Workers Must Be Taught To Prevent Accidents

By Ernest W. Fair

MANY thousands of dollars are spent each month to study industrial accidents and develop methods to reduce their number. Each such effort points up more and more the high degree of direct and personal responsibility on the part of individual workers in accident prevention.

A shop which has gone all-out to install accident prevention devices and safeguards is no safer than one without a single device if the place of the individual worker in accident prevention has been ignored. Every survey shows that unsafe acts of employees are the cause of most accidents. Too much attention never can be given to this aspect of accident prevention. Continued emphasis on the personnel causes of accidents has become a must in even the smallest shop.

Upon what specific unsafe acts of employees should we focus attention through house organs, bulletin board notices, safety programs in the shop and day-to-day training by supervisors and foremen? Here they are:

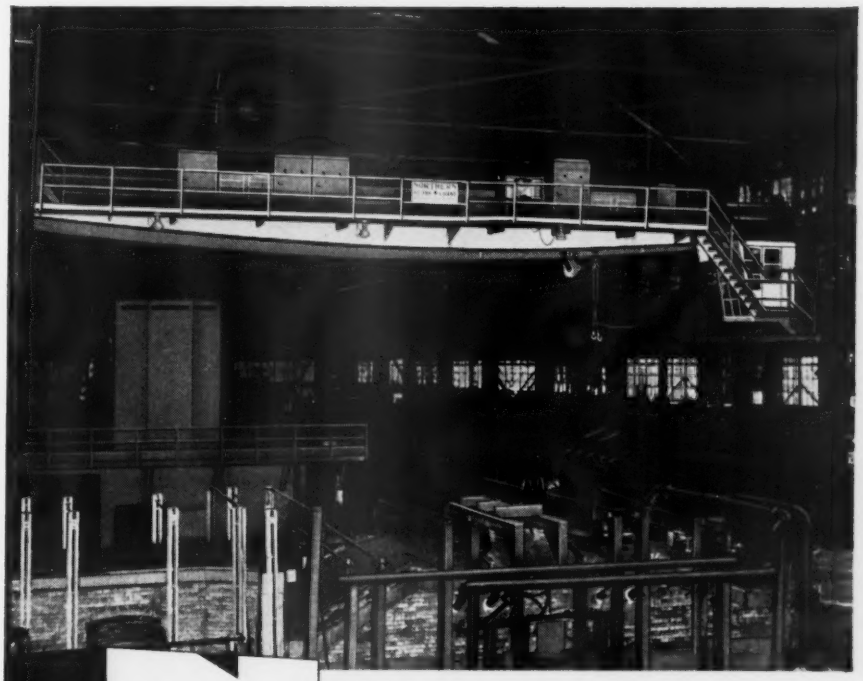
Removing Guards or tampering with adjustments on them has caused many accidents. Done sometimes in a spirit of horseplay, it more often occurs when a machine requires adjustment, after which an immediate replacement isn't made because "this time it isn't important." Every employee should be taught that there are no "if's" about the guards on the machinery around which they work, that there just are no exceptions to the rule that guards must always be in place when machinery is in use.

Improper Attitudes always spell trouble. Wilful disregard of safety rules and safe procedures is certain to mean an accident. A reckless, lazy or unco-operative individual is not only a potential accident victim himself, but is likely to involve other employees in his accidents.

Workers who persist in such attitudes should be kept away from any machinery or equipment which might be the source of an accident in the shop, for they seldom can be trained otherwise. Absent-minded or excitable persons are just as dangerous as the careless ones.

Persons who possess such traits,

Look overhead..see "NORTHERN"



NORTHERN CRANES *for severe service! for continuous operation! for safety and economy!*

The 40-ton NORTHERN SUPER CRANE shown is one of several Northern cranes operating in the Huntington Works of the International Nickel Company.

From drawing board to assembly floor no effort is spared in building uninterrupted service into NORTHERN HEAVY DUTY SUPER CRANES. They are built to stand rough handling, overloading and continuous operation. Mechanically, structurally and electrically they offer the maximum in safety and operating efficiency.

Northern Cranes are backed by over 55 years experience in designing and building cranes for steel mills, metal fabricating plants, automobile plants, paper mills, electrical manufacturers, railroads, and many other industries.

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NORTHERN ENGINEERING WORKS
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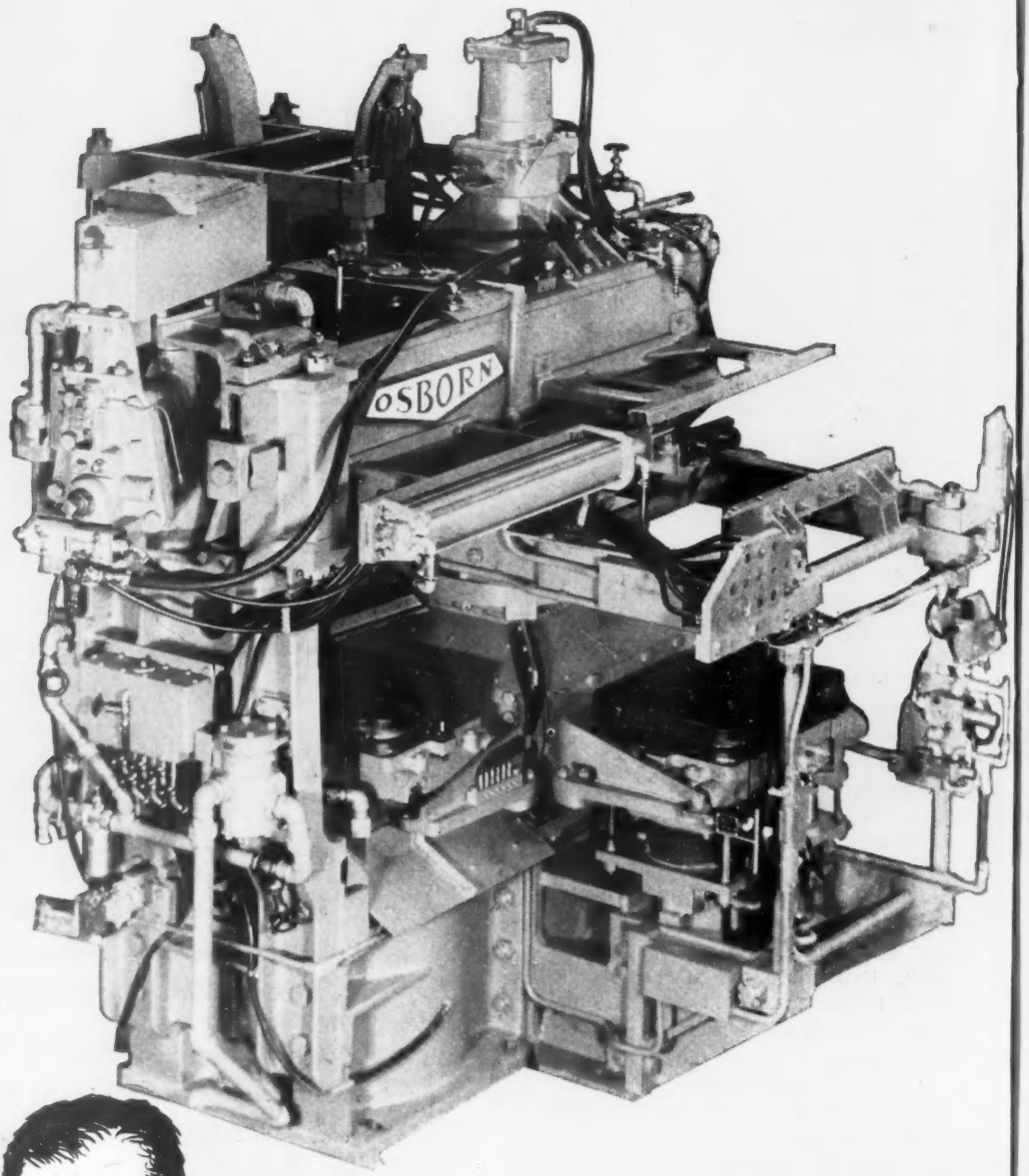
SAND TO FINISHED MOLD AUTOMATICALLY

FOR LOWEST

take a good look



What machine will do it best?

Is the machine the latest design?

and you

MOLDING COSTS...

k from every angle...

Is it
the most
efficient machine?

Check these points before you buy equipment

WHAT TYPE OF MACHINE WILL DO IT BEST?

With Osborn's complete line, there is a machine for each specific molding job. And there is a *field application engineer* to recommend the best machine for your work.

IS THE MACHINE THE LATEST DESIGN?

Foundry methods and techniques are making tremendous progressive strides... Osborn's contribution offers the most modern developments in mechanical construction, manual and automatic controls.

IS IT THE MOST EFFICIENT MACHINE?

With Osborn designs, machines can be equipped with automatic controls for operation on pre-set automatic time cycles... assuring uniform molds at peak production rates.

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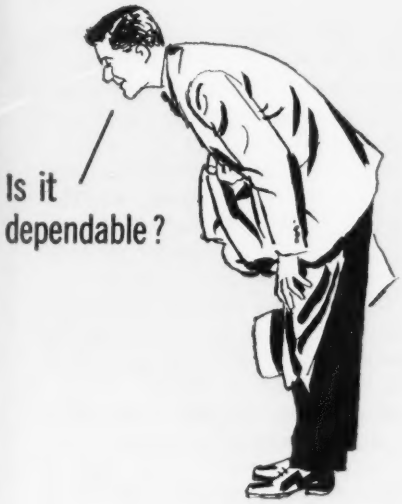
Osborn advanced ideas in design insure *continuous, dependable performance* over long periods of severe service. In addition, *complete interchangeability* of repair parts make maintenance easy... giving maximum availability for production.



Is it
dependable?

LEARN THE LATEST ABOUT OSBORN AUTOMATION FOR YOUR FOUNDRY

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THE OSBORN MANUFACTURING COMPANY

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Leader in automation for the foundry

Make
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without heat treatment!

Foundries without heat treating facilities are producing high-strength aluminum castings with Federated's Tenzaloy. Mechanical properties are equivalent or superior to the common heat-treated alloys, and impact strength is greater.

Tenzaloy, a product of Federated research, is a self-aging alloy of the aluminum-zinc-magnesium type. It reaches full strength after a few days aging at room temperature. No special casting precautions or facilities are required.

Tenzaloy castings have excellent machinability. They can be anodized to a superior white color. Tenzaloy is one of the few casting alloys that can be brazed at high temperature. It has corrosion resistance equal to or better than the aluminum-silicon alloys.

If your heat treating facilities are inadequate or too costly, or if you are paying for outside work, or if you are casting large and complex aluminum shapes which cannot be conveniently heat treated, call Federated for more information on modern Tenzaloy. Any of our 13 plants and 23 sales offices across the country is ready to help.

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which make them susceptible to accidents, should be screened out at the time of first employment or, if already employed, should be placed in jobs where they will not come in contact with shop machinery.

Operating Equipment Without Authority often is another cause of serious accidents. Strict rules should provide that only skilled operators are permitted to use given pieces of equipment. This point also calls for very close attention during training. No beginner ever should be permitted to work alone around a piece of machinery; the trainer or supervisor always should be present. Beginners should be permitted to operate the equipment alone only when they have passed definite tests, including a knowledge of safety measures, and possess a definite safety consciousness insofar as their machines are concerned.

Using Unsafe Equipment and Practices is still another unsafe act of employees high on the list of accident causes. There is little if any excuse for the presence of unsafe equipment in a shop; its owners are asking for accidents and resultant heavy damage suits. Nevertheless, such equipment does exist. Accidents also have been caused when employees used equipment that had been labeled unsafe, but still was permitted to stand on the floor.

Unsafe practices are another common danger that could be eliminated almost completely by greater awareness on the part of employees that there just is no such thing as "the one time it will be all right." Using every educational medium possible within the shop organization can secure some results on this score, but constant attention to the detail by supervisory personnel still is the best course.

Making Safety Devices Inoperative is a cause on almost every such list. Why employees will follow such a practice is hard to explain, but from time to time an individual deliberately makes such a safety device useless. At other times the actions of employees around the equipment have been responsible—on some occasions by "horse play" and on some even by practical joking.

The best method of avoiding accidents from such causes is in a day-in-and-day-out attempt by supervisory personnel to create healthy feelings of respect toward safety devices on the part of employees so that such an act is contrary to their natures.

Physically Unsuited Individuals working around equipment in the

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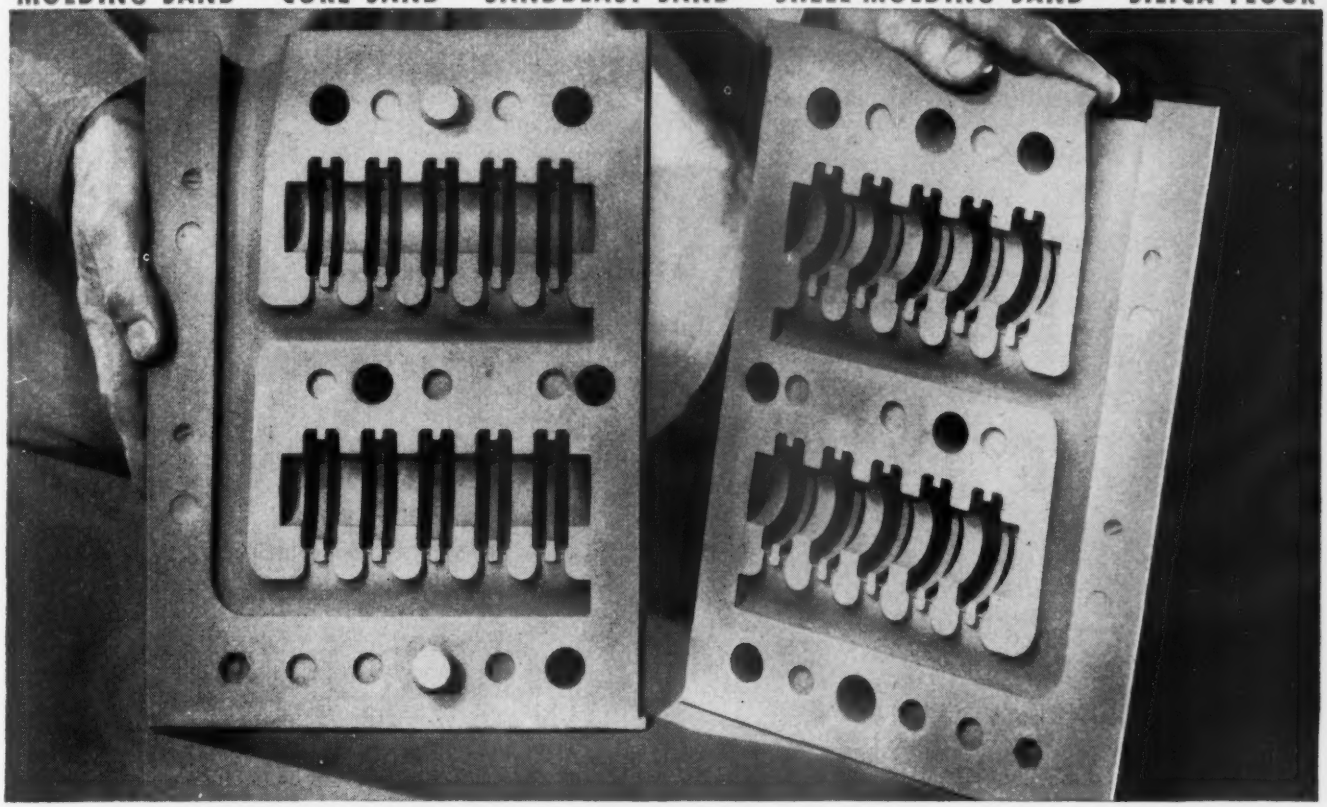

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Shell-Molding PENN-SAND

The best in the foundry is the sand that can be depended upon to produce the most flawless castings, time after time. Here's how Shell-Molding PENN-SAND can give you consistently better castings at low cost:

WIDE SCREEN DISTRIBUTION
—results in castings of exceptional finish, gives excellent permeability, eliminates gas problems.

LOW CONFINED EXPANSION
—aids mold stability, reduces rejects.

HIGH REFRACTORINESS
—facilitates pouring, prevents surface defects.

ABUNDANT SUPPLY
—insures immediate shipment of your orders.

LOW COST
—priced economically for bulk and bagged shipments.

For further information and free samples, fill out and return the coupon below. And remember—PENN-SAND is the sure start to a *perfect* finish.

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Here's a belt that is amazing foundry men

U. S. FoundryGiant Belt carrying shakeout sand.

It's U. S. Rubber's FOUNDRYGIANT Glass Fabric Belt

Consider its performance as reported by one of the largest and most modern foundries in California. One 18″ wide U. S. FoundryGiant belt carrying very hot reclaimed sand has lasted four times longer than any previous belt.

A second U. S. FoundryGiant glass fabric belt carries extremely hot shakeout sand back to the reclaiming system. A third U. S. FoundryGiant belt carries molding sand to the hoppers.

This foundry also uses other "U. S." quality products—pilot pipe and pinch valves to carry sand in a water slurry. The foundry management reports *high satisfaction* with the performance of all these "U. S." products.

The quality *and* durability built into everything made by "U. S." for the foundry industry lowers maintenance and overhead costs. "U. S." products are obtainable at any of our 27 strategically-located sales offices, or write address below.

Large pinch valve used in a water slurry.

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shop have been the cause of many accidents. Certain types of individuals (or those with certain handicaps) just cannot work around machinery of any kind. This point is a management responsibility, and no matter how short personnel is, no such individual should ever be assigned a job where an accident may occur. The particular piece of equipment and type of job routine involved will determine who should or should not work on that spot.

Working On Moving Machinery is the cause of many accidents each year. When things are in a big rush, an employee feels that an adjustment can be made or an oiling job done without stopping the equipment this one time—and, of course, an accident often does result, then and there. No adjustments ever should be made on equipment while it is in operation, even though one is sure that it can be done "this time" without accident.

Taking Unsafe Positions in the use of equipment also has been a common cause of bad accidents. Usually they result when an individual gets himself into a position out of balance and falls into the equipment. Once again, this is a point about which supervisory personnel must be constantly alert with employees who show a tendency to take such chances.

Unsafe Clothing has long been another cause of accidents, even in shops where employees have been warned again and again. The only way to avoid these is to make certain that one rule exists—when the individual shows up on the job in unsafe clothing, he just does not work that day!

Advice on Painting Is Free

A cost-free service designed to reduce losses caused by improper maintenance painting has been announced by Glidden Co., Cleveland. The "painting analysis" service provides expert technical aid for solving all commercial, industrial and institutional maintenance painting problems.

It is expected to be of particular value to organizations with acute corrosion problems involving machinery and other equipment, areas exposed to fumes or moisture, steel framework and pipes conducting liquids and gases. Glidden also will make recommendations concerning colors, finishes and training of maintenance personnel. The service is available through the company's Cleveland headquarters or any local representative.

CHIPPERS get longer, more comfortable protection

Rigid metal top bar holds sturdy nylon cups firmly—makes goggles much easier to handle, too!

Kover-Mor® Goggles designed for chippers are fitted with Willson *Super-Tough* lenses heat treated for greater impact resistance. Note how 4 screened eye cup ports admit air to keep lenses fog-free.

WILLSON

Kover-Mor® Goggles are roomy

...fit over large-frame prescription glasses

Kover-Mor® Chipper's Goggles are made of lightweight nylon with the highest *strength/weight ratio* known for goggle cups. Chippers say they have features that make them the most comfortable goggles of all.

Snug, easy fit is assured by adjustable two-piece headband, leather bridge curtain and metal top bar. Extra ventilation is provided by slots in screw caps *plus* ports in cups.

Standard 50 mm. round lenses fit Kover-Mor® Goggles. No need to stock odd-size replacement lenses! Lens changing is simplified by external screw caps.

Ask your Willson distributor for Kover-Mor® Chipper's Goggles—available with opaque or clear nylon cups. They'll withstand toughest use.

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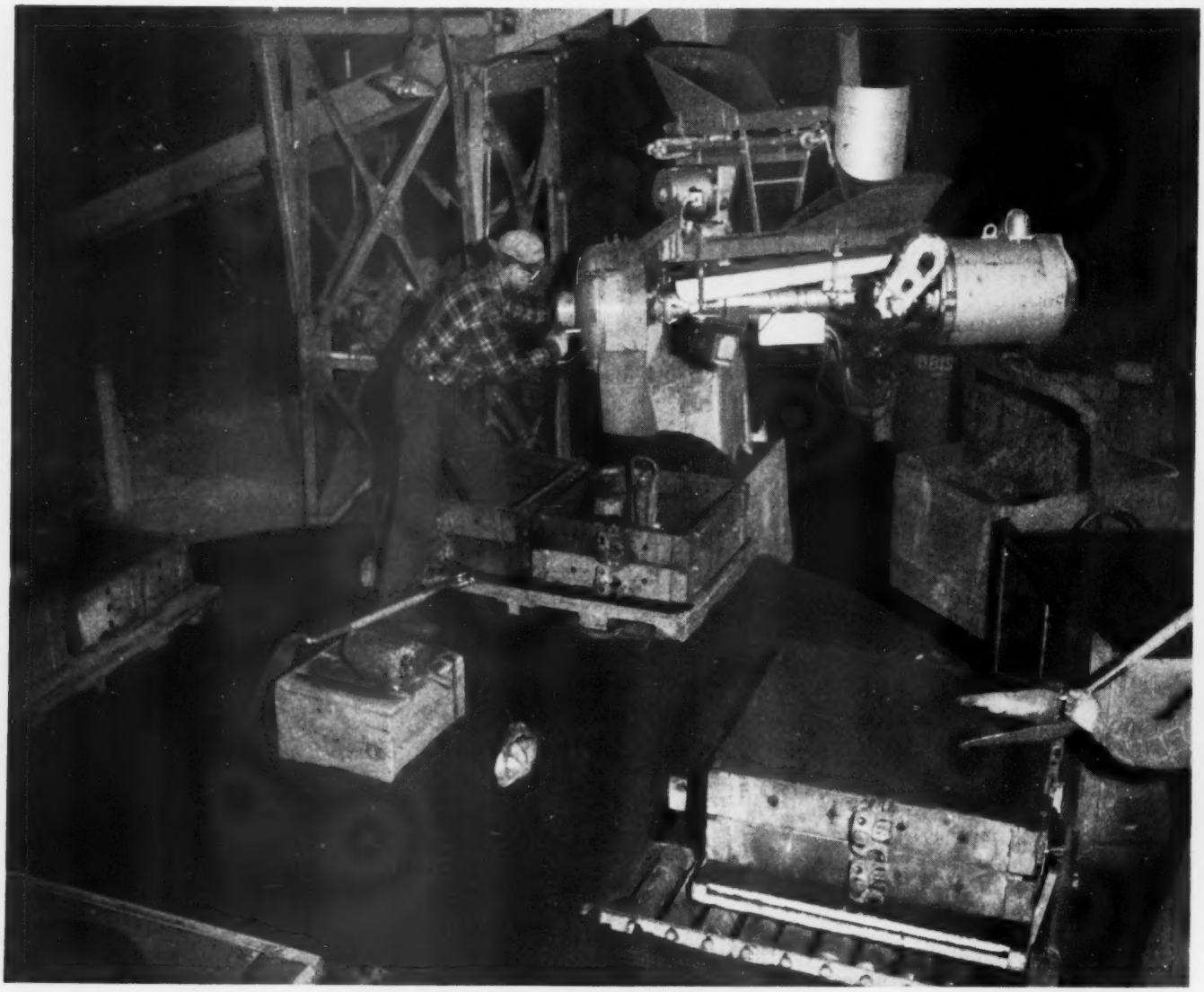
(Advertisement)

Costs cut by 20% to 50% in the mechanization of two Maritime foundries

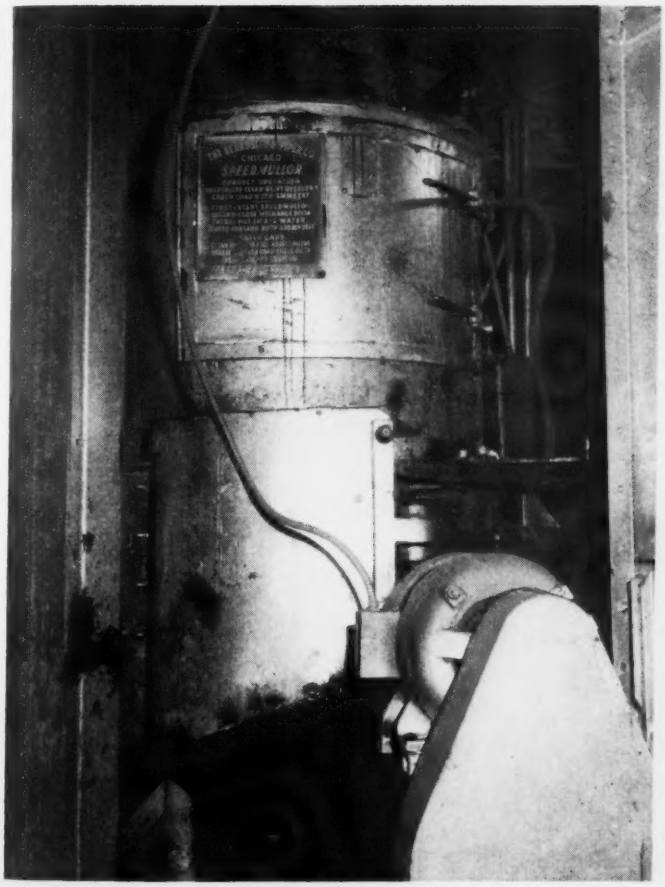
Steel castings from Maritime Steel and Foundries, Limited of New Glasgow, Nova Scotia have been a part of almost every important project in Canada's Maritime provinces during the past thirty years. The brass and iron foundries of T. McAvity and Sons, Limited at Saint John, New Brunswick are among the largest in these same provinces. There is little similarity in these two organizations except for their progressiveness, as these two firms are among the most progressive in Canada. It's not surprising that both Maritime and McAvity have installed Sandslinger-Roto-Mold units to handle their molding, for these highly flexible units have been installed by leading foundries throughout the world. It's not surprising either that both Maritime and McAvity depend on Speedmullors to thoroughly mull all of their molding sand.

Results are typical of the benefits obtained in hundreds of other foundries using this type of equipment. At Maritime the total man-hour-per-ton rate has been reduced by more than fifty percent. A single Model "40" Speedmullor prepares all of the foundry's molding sand . . . over eighty tons daily, and a Slinger-Roto-Mold Unit handles all of the foundry's molding. A B & P Rol-A-Draw machine rolls over and draws all of the molds.

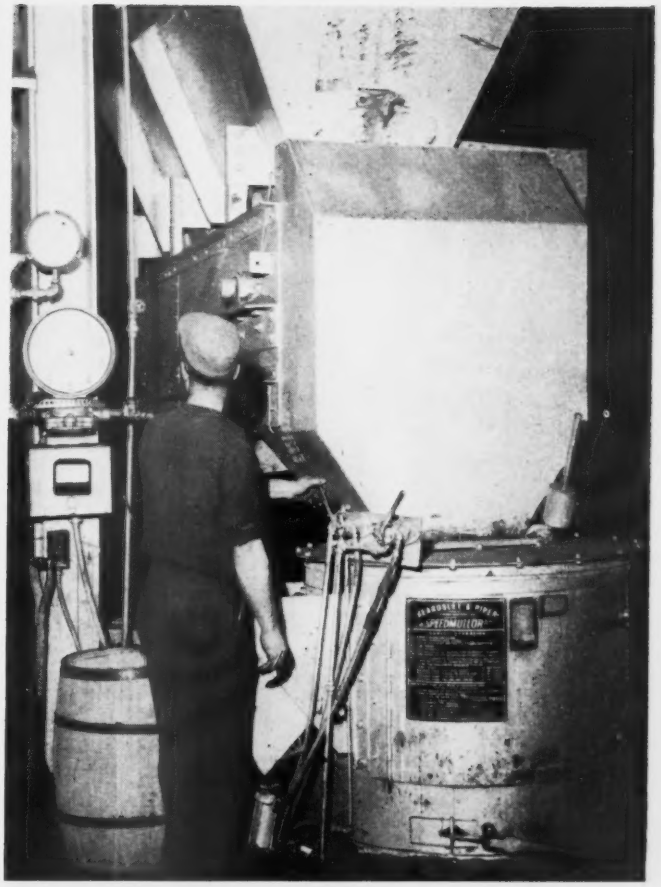
At McAvity the new molding unit handles over seventy percent of the molding with an actual molding man-hour saving of more than twenty percent. A B & P 50 Speedmullor - 40 Preparator unit prepares all of the sand for the iron foundry while a Model "30" Speedmullor prepares sand for the brass foundry.



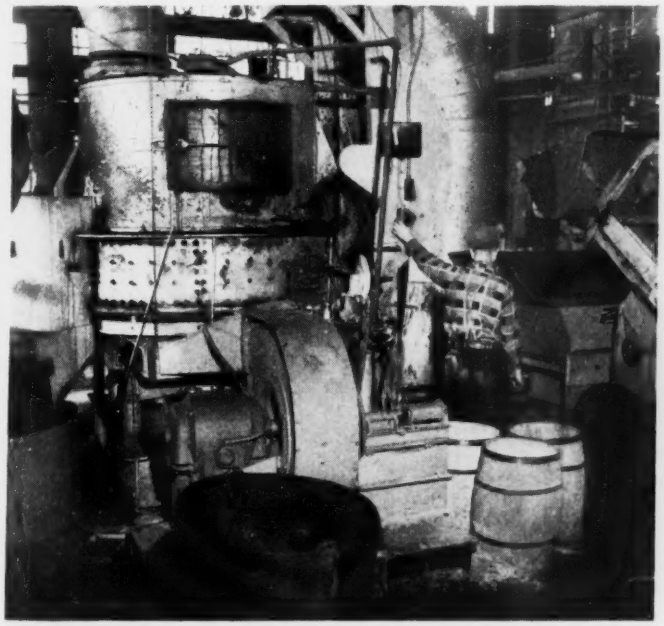
TOTAL MAN-HOUR-PER-TON SAVINGS OF OVER 50% were a result of the successful mechanization of Maritime Steel and Foundries, Limited. This Slinger Roto-Mold Unit, installed as a part of this mechanization, handles all of the foundry's molding. Both wood and metal patterns are used and many of the smaller patterns are mounted with cope and drag on the same board, as shown here.



THIS SINGLE MODEL "40" SPEEDMULLOR prepares all of the molding sand for Maritime Steel's molding operations. A six-cubic-foot batch of closely controlled synthetic sand is prepared every one-and-a-half minutes. Since the entire plant depends on this mullor, the Speedmullor's no down-time record is important.



McAVITY'S BRASS FOUNDRY OPERATIONS are provided with a dependable supply of thoroughly mulled molding sand by the Model "30" Speedmullor. The sand is prepared in four-hundred-pound batches and total cycle time is ninety seconds. A green strength of 8 to 9 psi. is held uniformly from batch to batch.



A SPEEDMULLOR-PREPARATOR UNIT with Model "60" Speedmullor and Model "40" Preparator provides fully mulled and conditioned molding sand to the slinger. Sand is discharged from the Speedmullor into a B & P Roto-Feed for delivery to the slinger.

McAVITY'S SANDSLINGER-ROTO-MOLD UNIT handles both wood and metal patterns and wood and metal flask equipment. With the new unit the foundry has greater range and productivity and far greater output is obtained from the existing floor area.

BEARDSLEY AND PIPER Division Pettibone Mulliken Corp.

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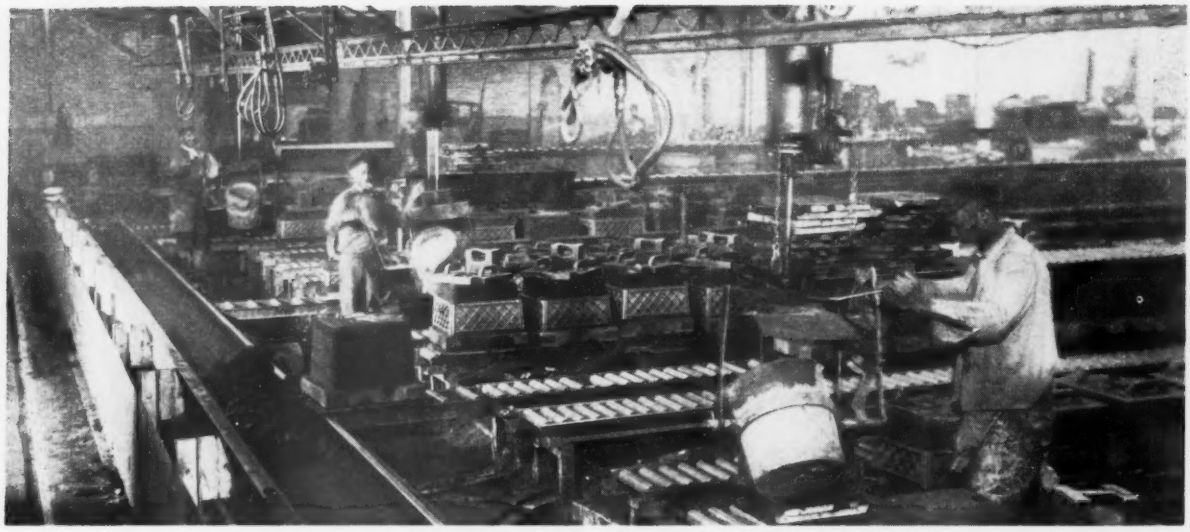


Pouring molds on roller conveyors at Forest City Foundries Co., Cleveland. Conveyors discharge to vibrating conveyor leading to shakeout

Modernization Program Includes

MECHANIZED SAND HANDLING

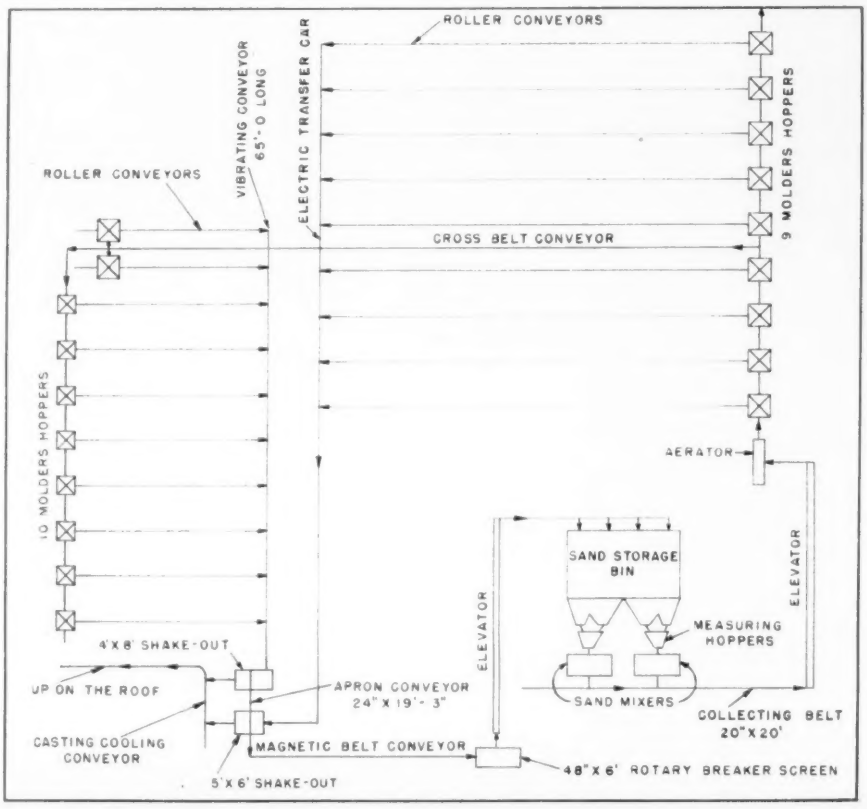
By FRANCIS A. WESTBROOK

THE Forest City Foundries Co., Cleveland, has recently completed a modernization and expansion program of its Walworth Run plant. This provided for extensive mechanical handling, among other things, and has generally increased the efficiency of the plant. The present layout is shown in the accompanying sketch, which indicates the flow of materials in the foundry.

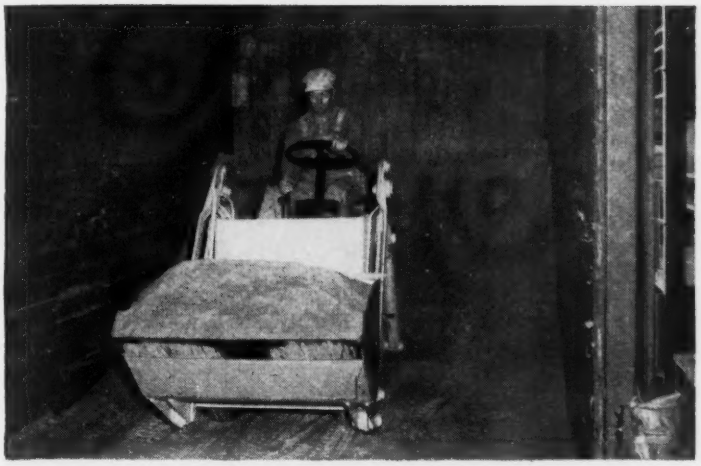
At the left is a mechanical vibrating conveyor 30 in. wide by 65 ft long used in connection with ten molding machines and served by 20 roller conveyors. As the molds are made they are pushed away on the roller conveyors for pouring, after which the sand and castings are dumped on the vibrating conveyor.

The latter has a ¼-in.-thick steel pan deck which provides ample wearability because its vibration sets the material in motion by induced hopping rather than by sliding it along the surface and causing abrasion. This conveyor discharges to a shakeout machine, Fig. 3, and has a beveled end to aid in distributing the load more evenly on the 4 x 8 ft shakeout grid. The castings pass on to a recently installed cooling trolley conveyor extending out over the roof and back to an area close to the cleaning department.

Sand is carried away from the shakeout by an apron conveyor and is picked up by an inclined magnetic belt conveyor, which delivers it to a rotary breaker screen. It is then



Arrangement of new mechanized equipment. Photos courtesy of Jeffrey Mfg. Co., Columbus, O.



Shortest Turning Radius

——AT FARM BUREAU SERVICE, Clark's Y-20 Scoop rolls into boxcars to handle fertilizer. With the shortest turning radius of any machine on the market, a tight 71 inches, the Y-20 is unbeatable for handling packed material in cramped quarters. See for yourself . . . ask for a demonstration.

Full 60" Dumping Clearance

——AT AMERICAN MARSH PUMP, the Y-20 Scoop shovels molding sand into shaker. Here's *clean-up-ability* . . . close scraping of floors, corners and sides. The Y-20 Scoop has plenty of reach for high hoppers, has a 60" clearance under the lip, will easily dump into bins and hoppers 86" high. See an "action" demonstration.

Full Bucket Loads Every Time

——AT ALLIED PAPER MILLS, clay is handled 17% faster with Clark's Y-20 Scoop. Low-level hydraulic tilt-back guarantees full bucket loads every time, permits carrying in lowered position without spillage. There's plenty of power, plenty of traction—fully loaded, the Y-20 Scoop will climb a 14% grade. Ask for a demonstration.

Dollar for dollar Clark's New Y-20 Scoop will outperform anything in its field.
Ask for a demonstration!

Industrial Truck Division, **CLARK EQUIPMENT COMPANY**, Battle Creek 16, Michigan

A BETTER BUY WITH LOCAL SUPPLY— *Genuine Clark Parts*

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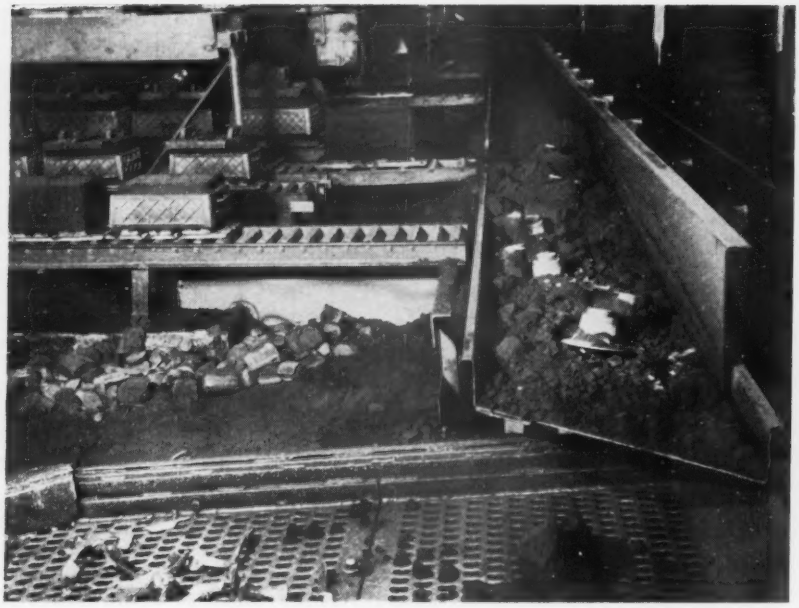
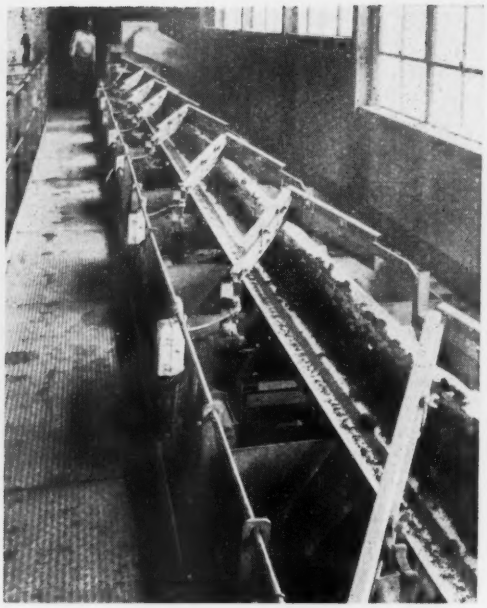


Discharge end of vibrating conveyor at the shakeout station



Plows divert sand to molders' hoppers

elevated about 45 ft to a bin conveyor, which discharges the sand into a storage bin. From there the sand passes through two measuring hoppers and two 3000-lb capacity mixers to a 20-in.-wide conveyor 20 ft long. The prepared sand is next elevated about 45 ft by a bucket elevator to an aerator.

This continuous blending machine aerates and cools the sand at the rate of 45 tons per hour. It is of the rotating cage type. Sand is fed on to the outside of the rotor, which is made up of two steel end castings 18 inches in diameter, across which are mounted four cast steel, heat treated bars. These bars are removable and can be turned so that all four sides can be presented to the sand, thus obtaining maximum life from them.

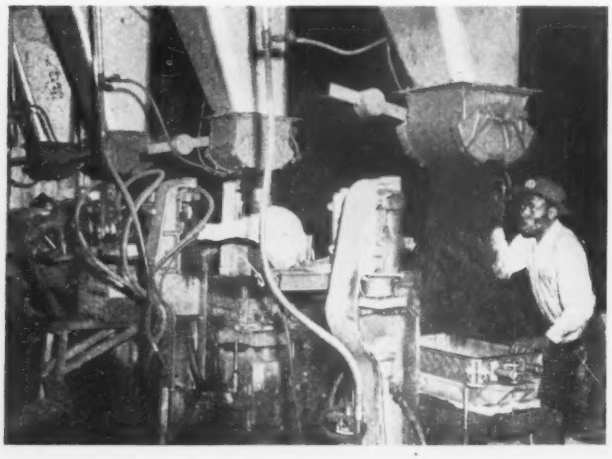
Sand is picked up at the aerator by a 20-in.-wide distributing belt conveyor running above the molders' hoppers on that side of the foundry. The hoppers are provided with 15 x 24 in. foundry type clamshell valves with operating levers.

A 20-in. cross conveyor 119 ft long runs from this line to the squeezer line on the other side of the foundry. It operates at 150 ft per minute and can handle sand at the rate of 35 tons per hour. It is equipped with a belt edge wiper to clean the belt.

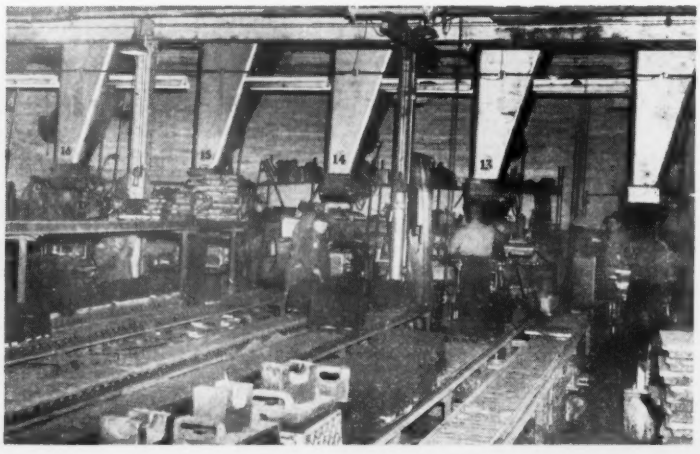
This cross conveyor discharges into a distributing belt conveyor, which feeds the ten molders' hoppers on that side of the foundry. It also is 20 in. wide and has the same speed and capacity as the cross belt. Sand is distributed to the hoppers by automatic V-ploughs, each of which is equipped with a 2-in.-diam by 8-in.-stroke air cylinder with clevis, bracket, four-way single solenoid spring return master control valve, and a photo switch hopper level control with the necessary probe fittings. The bottom of each hopper is also provided with clamshell type valves. A general view of the molders' hoppers and molding area with the roller conveyors leading to the mechanical vibrating conveyor is seen in the illustration below.

Molds from the side of the foundry having nine molding hoppers, most of which are large tight flask molds, are delivered by electric transfer car to a separate 5 x 6 ft shakeout. From this shakeout the castings travel to the roof on the same cooling conveyor as the castings from the MV conveyor. The used sand follows the same route for remixing and distribution as already explained.

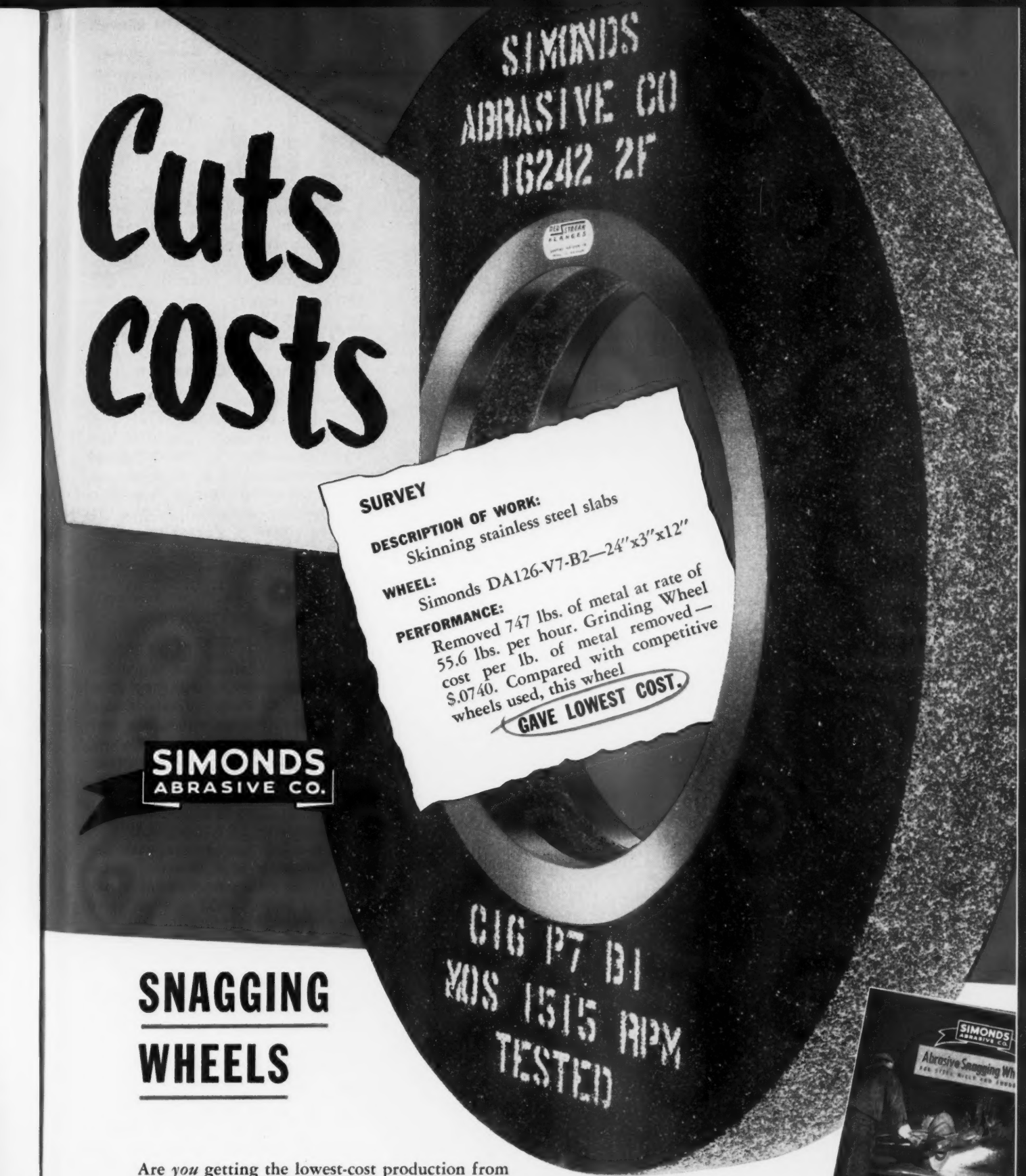
Molders receive sand from overhead hoppers



General view of part of the molding area

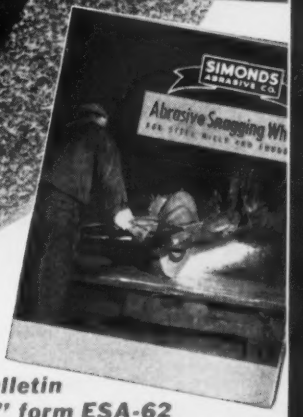


Cuts costs



SNAGGING WHEELS

Are *you* getting the lowest-cost production from your grinding wheels? Let a Simonds engineer help you find out. Whether you use floorstand, swing frame or portable grinders, he can recommend the Simonds Wheels to give you fast, economical production.



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Foundry Developments

By EDWIN BREMER
Metallurgical Editor

NOISE control received major consideration in the design of a large, new gray iron foundry now being completed for an eastern machine tool builder. Interior walls and ceiling of the plant are lined with panels of perforated aluminum backed up with a sound-absorbing material. The foundry is expected to start pouring metal within two to three months.

Simplifies Riser Calculation

STUDIES have shown that the usual complex surface area to volume relationships employed to calculate riser dimensions for steel castings may be replaced with easily obtained shape factors expressed by SF = (L + W)/T—that is, length, width and thickness. This is reported by H. F. Bishop, E. T. Myskowski and W. S. Pellini in "Simplified Method for Determining Riser Dimensions," presented at the recent AFS meeting. The authors developed empirical graphs relating riser volume to casting volume for rapid calculation of minimum effective risers for simple castings. They also devised procedures for complex shapes featuring appendages such as thin sections joined to heavy sections, and for shapes involving retarded cooling rates, such as cylindrical castings containing small cores.

New Material for Coke

METALLURGICAL coke and high-test gasoline are to be manufactured from Utah's native gilsonite deposits, according to *Industrial Research News-letter* published by Armour Research Foundation of Illinois Institute of Technology, Chicago. Gilsonite, a natural asphaltic mineral, is noted for its lack of impurities. Project is said to call for expenditures of $10 million by American Gilsonite Co., Salt Lake City.

Low Temperature Service

RESEARCH into low-temperature properties of certain nonferrous alloys about which very little is known has been conducted under Signal Corps contract to determine the best materials for service use at low ambient temperatures. Some of the results are described in report PB 111657 "Studies in the Behavior of Certain Nonferrous Metals at Low Temperatures" which is available from the Office of Technical Services, U. S. Department of Commerce, Washington 25 for $4. Materials studied include nickel and nickel-base alloys, tin, tungsten, molybdenum, germanium, tantalum, and beryllium copper. Test temperatures ranged from 90 to minus 100°F.

Conference on Chromium

INTENSE interest in production, properties and applications of ductile chromium are indicated in the joint sponsorship by the Office of Ordnance Research, U. S. Army and American Society for Metals of a four-session conference relating to various phases of the subject. Conference will be held during the forthcoming National Metals Congress at Philadelphia, Oct. 17-21.

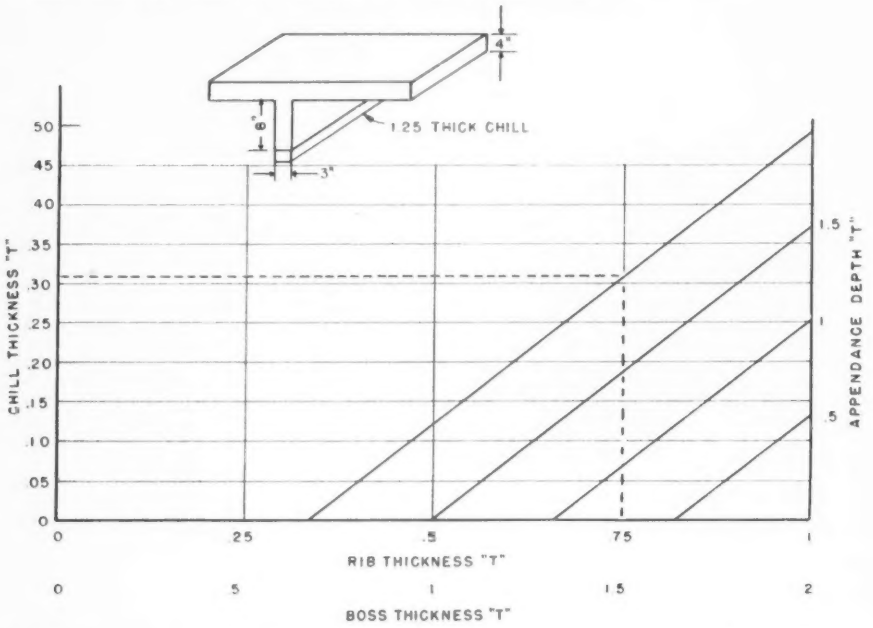
Simulates Freezing

A PAPER, "Metal and Mould Research on Steel Castings," by J. A. Reynolds, A. Preece, J. M. Middleton and J. White which was presented at the recent annual meeting of the Institute of British Foundrymen, mentions that stearin wax containing 2 per cent naphthalene in cooling appeared to exhibit the same characteristics as freezing steel. At low pouring temperature with the wax showing seed crystals in the melt, the columnar-equiaxial structures of normal steel castings could be obtained, but when the temperature of the wax is too high a structure consisting of alternate bands of columnar and equiaxial crystals was obtained—such as sometimes is exhibited in large steel castings.

Should Do More Bragging

FOUNDRYMEN in general frequently fail to inform their customers and prospects of their abilities and accomplishments in producing castings. One exception to this is illustrated in a four-page bulletin recently published by Cooper Alloy Corp., Hillside, N. J. Dealing with production of jet engine support rings by the shell molding process, the bulletin states the problem and how it was solved. While other foundries are using a similar approach, the practice is not as widespread as it should be.

Determining Size of Chills in Steel Castings



Application of graph illustrating the case of a 4-in. plate with rib 3 in. thick and 8 in. deep. T equals plate thickness, 4 in.; ¾ T equals rib; 2 T equals rib depth. Chill equals 0.31T or 1.25 in. (Data from "Application of Chills," E. T. Myskowski and W. S. Pellini, presented at the 1955 convention of the AFS)

BASIC NEWS
FOR CUPOLA OPERATORS

Basic Refractories offers field service to foundries

Cupola operators interested in adopting a basic practice can get maintenance information and assistance from Basic Refractories' engineers. These men know refractory application and are familiar with cupola practice.

BASIC CUPOLA OPERATION MEANS BETTER POURING CHARACTERISTICS

Operators of basic lined cupolas find that metal produced with basic slag systems has superior pouring characteristics.

Basic melted iron is usually more fluid than acid iron at the same temperature and of equivalent carbon. This is believed due to the higher carbon-to-silicon ratio generally found in basic melted iron. *The result can be less scrap castings.*

Higher metal tap temperatures

Basic slags have a constant cleansing action on coke ash in the cupola. New surfaces of carbon are always exposed for combustion and absorption by the molten metal. Higher metal tap temperatures and a smoother operation result from this slagging action.

Basic linings for cupolas offer 8 advantages

Costs of Basic linings are higher than acid. But these costs are offset by the following advantages:

1. **Lower sulphur content in the iron produced.**
2. **Greater carbon pickup.**
3. **Higher metal tap temperatures.**
4. **Use of lower cost charges.**
5. **Absence of bridging and clean drop.**
6. **Better pouring characteristics of metal.**
7. **Less scrap castings.**
8. **Steel scrap can be substituted for low phosphorous pig iron without lowering the total carbon content of the iron.**

Most basic cupola operators realize a 10% to 15% melting rate increase. Absence of bridging and clean drop are other advantages offered by basic operation.

BRI Gun—Gundol have many advantages for cupola maintenance

The BRI Gun—first gun specifically designed for refractory emplacement—offers many advantages. It handles either basic or acid refractories and reduces to a few minutes work the making of a dense, monolithic repair. The "laying up" of brick, with resulting joints subject to chemical and physical erosion, is eliminated.

Gundol, used in combination with the BRI Gun, is highly recommended to the basic cupola operator for maintenance. The high magnesium and calcium oxide content of Gundol is refractory and resistant to basic slags. Controlled sizing and added chemical bonds cause the refractory to adhere well when gunned in place.

Using BRI Gun to install basic cupola lining

BASIC REFRACTORIES INCORPORATED

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REFRACTORIES ENGINEERING AND SUPPLIES, LTD.—EXCLUSIVE CANADIAN AGENTS

Produce cleaner castings

...with ladle linings made of J-M 3X Blazecrete® — the hydraulic setting refractory

J-M 3X Blazecrete makes possible cleaner castings because it has great ability to resist penetration and attack by molten metal.

3X Blazecrete . . . the 3000F refractory . . . is easily and quickly applied . . . mix with water like ordinary concrete, and slap-trowel to desired thickness. Hardens without application of heat. Contains no harmful irritants . . . safe even for hand application. 3X Blazecrete is furnished as a dry mix, and may be stored indefinitely without deterioration.

Longer lasting linings can be built with 3X Blazecrete because it is spall-resistant, withstands slagging action and has negligible shrinkage.

Send for free brochure on Blazecrete (RC-28A) describing its properties and uses. To obtain your copy—as well as additional application details—write Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit, Ontario.

Whether you gun it... *or slap-trowel it...*

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville BLAZECRETE

BUILDS BETTER REFRACTORY LININGS

Obituary

GOSTA VENNERHOLM, 56, assistant manager of the Manufacturing Research Department, Ford Motor Co., Dearborn, Mich., died Sept. 9. Mr. Vennerholm, a native of Sweden, was graduated from Technical College, Stockholm, and joined Ford's metallurgical staff in 1924.

GOSTA VENNERHOLM

From 1933 to 1938 he supervised the re-organization of Ford foundries in Europe. In 1939 he received the William H. McFadden Gold Medal of the American Foundrymen's Society for outstanding contributions to the castings industry in the field of ferrous metallurgy and practice.

* * *

Anthony H. Kramer, chairman of the board of directors, Advance Foundry Co., Dayton, O., died Sept. 6. Mr. Kramer started as a molder and for several years was superintendent of the former Bryan Foundry Co., Indianapolis. He joined Advance Foundry when it was organized in 1904, and became president in 1910. Mr. Kramer was active in the former Ohio Foundries Association, and was its president in 1931.

* * *

Arthur J. Binz, 80, founder and president, Houston Foundry & Machine Co., Houston, Tex., died Aug. 26. He founded the company 50 years ago.

* * *

Herbert J. French, 62, since 1947 vice president, International Nickel Co., New York, and assistant vice president, International Nickel Co. of Canada Ltd., died Aug. 17. Mr. French was graduated from Columbia University's School of Mines, joining

the company in 1929. Well known as a metallurgist, Mr. French was the recipient of many distinguished technical awards for his contributions to the science of metallurgy.

* * *

Julius C. Roller, 89, retired foundryman and metal consultant, died Aug. 12, in Milwaukee. A native of Germany, he came to United States as a child and was an iron molder by trade. He was associated with Waukesha Malleable Casting Co., Waukesha, Wis., St. Louis Malleable Casting Co., St. Louis, and Cream City Foundry Co., Milwaukee. Mr. Roller retired in 1932 after 13 years as a metal alloys consultant.

* * *

Patrick Halloran, president, Halloran's Brass Foundry Inc., Long Island City, L. I., died Sept. 8. He was currently serving as a director of Metropolitan Brass Founders Association.

* * *

William J. Strangward, 76, president, Forest City Foundries Co., Cleveland, died Sept. 5. Following high school, he joined the company founded by his father, William

WILLIAM J. STRANGWARD

Strangward, who was its first president. With the company 60 years, he worked in all departments, and became president in 1925.

Studies Management Training

"Current Practice in the Development of Management Personnel" is a new report released by American Management Association. It describes management development techniques used by companies participating in the study, examines some current company practices, and suggests how to get the most from programs for developing and training managerial personnel. Copies of the report are available from the association, 330 West 42nd St., New York 36, at $1.25 to AMA members and $1.75 to nonmembers.

LOOKING FOR FOUNDRY SAFETY APPAREL?

LOOK TO *STEEL-GRIP* FOR BETTER PROTECTION AT LOWEST COST

Steel-Grip offers a complete line of safety apparel for every foundry need. Note especially the Steel-Grip designs in new materials extremely resistant to heat, molten metal splash, acids, caustics, abrasion and wear. Since 1910, quality manufacture from selected materials has been our standard practice. We offer correctly designed safeguards, in leather, duck, Perma-Proof materials, asbestos, wool, Dynel cloth, Jaxcolite-coated materials, aluminum-coated materials, etc. They give long wear, uniform dependability at the lowest man-hour costs . . . the real measure of value. Don't buy on appearances or first price. Buy safeguards like you would buy machines . . . on performance. Buy tested and proved Steel-Grip safeguards and watch your costs go down. Write today for complete catalog.

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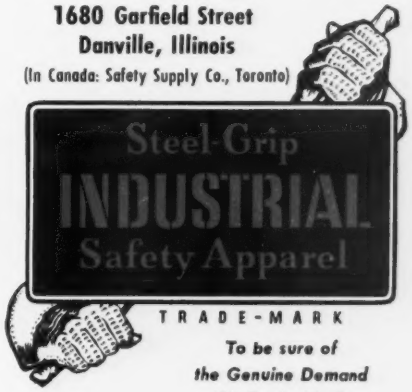

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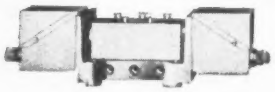
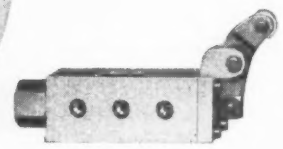
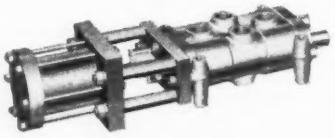


Single Solenoid Single Plunger Control Valve



Cam Operated "O-Type" Valve



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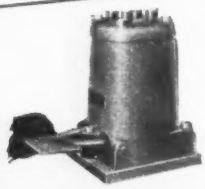

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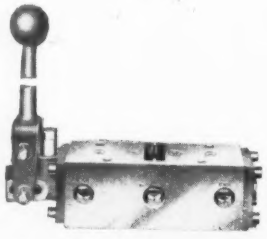

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Investment Casting Institute To Hold Convention Nov. 1-3

The Investment Casting Institute's third annual meeting, to be held at Sheraton-Cadillac Hotel, Detroit, Nov. 1-2, will feature discussions on use of investment cast parts in planes and automotive turbines. Newer casting methods, including the Glascast, Investment X and the Ellis processes will be discussed by Dr. N. J. Grant, Massachusetts Institute of Technology.

Other topics include a talk by Dr. Richard Flynn, University of Michigan on "A Study of the Solidification Phenomena," and a discussion by Walter Sulzer, Sulzer Bros., Switzerland, on progress of the investment casting industry in Europe. Also the four ICI standards committees will meet during the convention. Final day of the meeting will be devoted to a study of the industry's management problems at a "members only" business session.

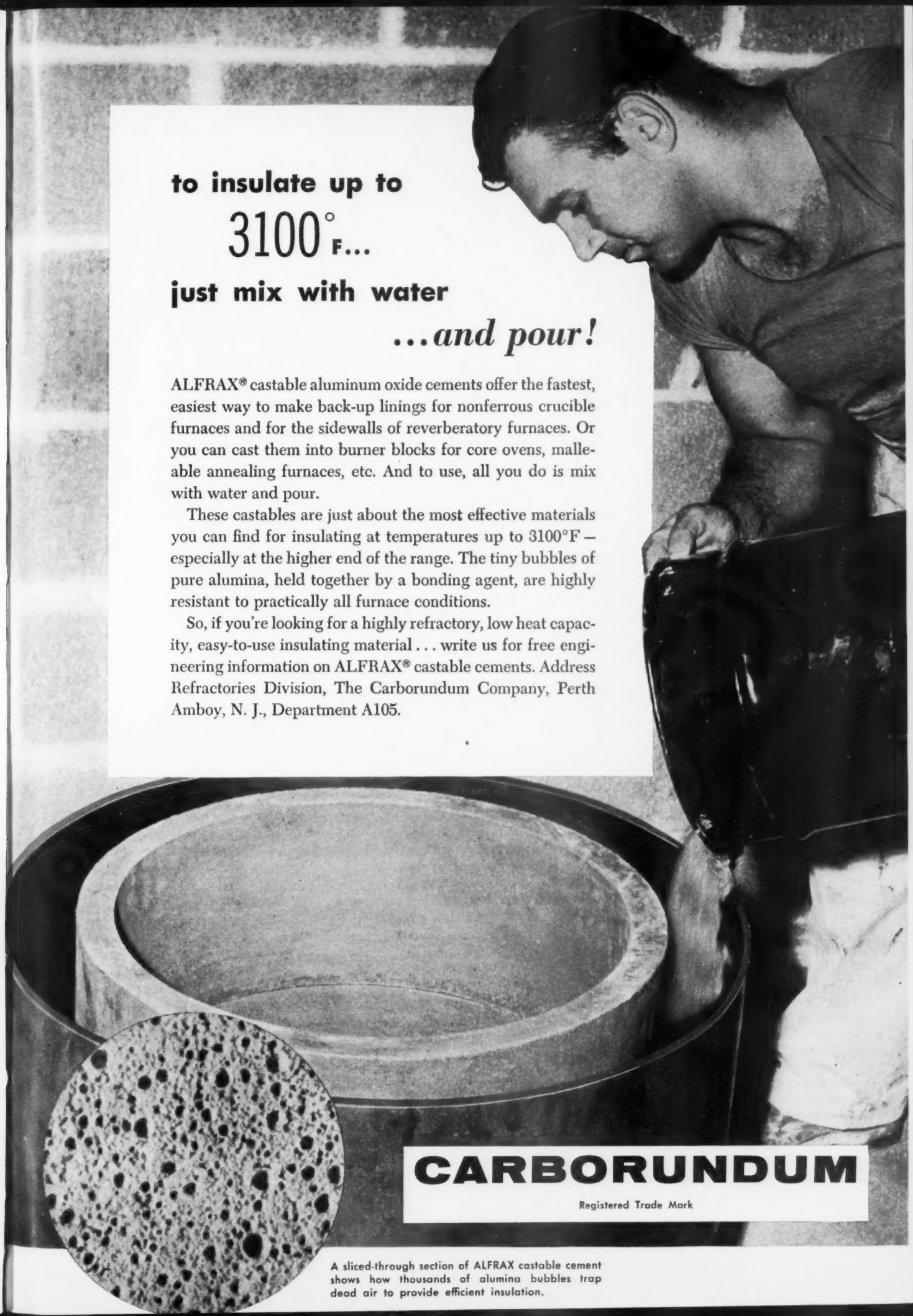
Non-Ferrous Founders' Society Publishes Buyers' Guide

A revised edition of the *Buyers' Guide for Non-Ferrous Castings* has been published by the Non-Ferrous Founders' Society, 192 North Clark St., Chicago. A similar record will be published annually in the future, and each annual issue will be augmented by supplements as further information is received from additional foundries which participate in the society's project.

The guide contains a listing of nonferrous foundries by states which includes data concerning alloys cast, size, maximum quarterly casting production, maximum melting capacity, other facilities owned, fuel used for melting, size of castings, number of foundry employees, plant area, literature available and distinctive alloys cast.

Safety Congress Is Oct. 17-21

National Safety Council will hold its 43rd National Safety Congress and Exposition Oct. 17-21 in Chicago. Included in the metals section discussions is a paper by G. W. Merrifield, Giffels & Vallet Inc., Detroit, on "Automatic Mechanization in the Foundry." Other sessions will cover industrial noise control, accident cost accounting and the human element in industrial accident prevention. Congress meetings will be at the Blackstone, Congress, LaSalle, Morrison and the Conrad Hilton hotels where safety products, equipment and services will be exhibited.



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just mix with water

...and pour!

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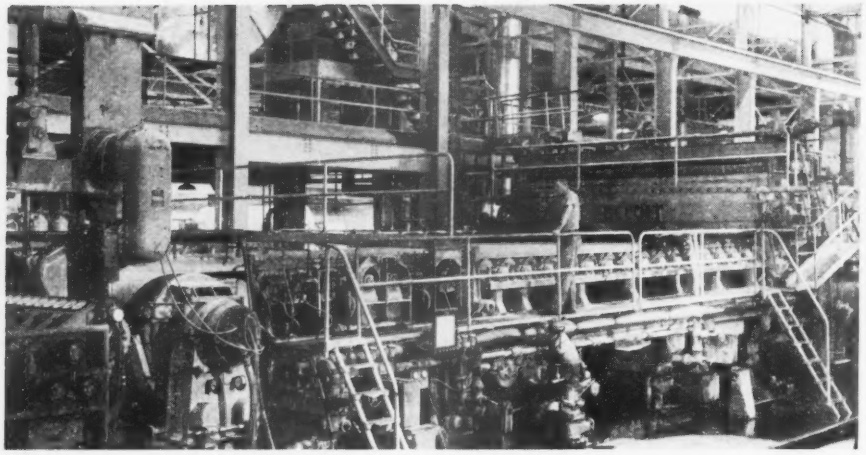

Many castings are required to build papermaking machinery. Part of a large dryer weighing 2000 tons is shown here

Lumber and Paper Are Important to

OREGON FOUNDRIES

By DEWAR FORBES

OREGON, the ninth largest state, with an expanse of more than 96,000 square miles, cannot be considered a great manufacturing state. Its area exceeds that of Ohio, Pennsylvania, and New Jersey combined, but it has only one foundry for every 20 in the three-state area.

Oregon is strictly a timber state, concerned with lumber and its by-products. One-fifth of the standing timber in the country is in Oregon today. And a system of replanting carried out on a large scale in the last few decades, particularly by the big papermaking concerns, makes it seem likely that it always will remain a lumber state.

The lumber and paper and pulp industries are the big outlets for foundry products. As early as 1873, one tree in the forest yielded 78,000 board feet, and this fact alone indicates the heavy machinery the lumber industry calls for, both in the forest and the sawmill.

The modern papermaking machine consists of about 3000 individual ferrous and nonferrous castings. Castings range in weight from a few ounces to 40 tons, as in the case of the large dryer, part of which is illustrated above. This unit, built by the Beloit Iron Works, Beloit, Wis., weighs 2000 tons, exclusive of the electric drive, and cost around $3 million.

To date a complete new papermaking machine has not been made in Oregon, but many have been rebuilt, and many auxiliary machines for the industry are produced. In recent years an Oregon firm, Morden Machines Co., has put new processing machines on the market which now are distributed all over the world.

Just when the first foundry was started in Oregon is a matter of conjecture. The first castings for the lumber industry came from San Francisco, where a foundry started up shortly after the gold rush of 1848. Some old buildings in Portland, Oreg., today display castings of that period from San Francisco.

Most of Oregon's foundries are in Portland, the state's largest city, with population of around 400,000. There are small foundries in other Oregon cities, such as Salem, the state capital, Oregon City, the cradle of the west, Bend, Klamath Falls, Eugene, Silverton, and Grants Pass. But of the state's total of about 65 foundries, more than 40 are located in Portland.

In 1855 two well-trained mechanics, the Smith brothers, opened a foundry in Portland in the substantial brick buildings which had formerly housed the state penitentiary. For some 85 years the foundry operated on that same site, but some 15 years ago the place was destroyed by fire, and it was never rebuilt.

By 1869 the Smith brothers had a good start, the firm then being known as Smith-Watson. In that year, when the population of Portland was only 10,000, Smith-Watson were fortunate in securing the services of a well-trained foundryman, Robert Collier of San Francisco. Mr. Collier became general superintendent and later secretary and part owner.

During World War I, Smith-Watson added a shipbuilding plant and employed over 6000 people in that department alone.

About 35 years ago Smith-Watson became associated with the Valley Iron Works, Appleton, Wis., and made much auxiliary machinery, involving intricate castings, for the paper and pulp industry. This was in addition to castings for the logging industry and architectural castings such as columns for the junior skyscrapers that began to spring up in Portland fifty years ago.

In the eighties, besides Smith-Watson, the principal foundries were Union Iron Works, Wolfe-Zwicker Iron Works and Portland Iron Works. Portland Iron Works is the only one of the four still in business. Officers of the company are Leroy C. Anderson, president, and Lester E. Anderson, secretary-treasurer. This foundry poured its first casting in 1862. In addition to the foundry, one of the best equipped machine shops in the Pacific Northwest has been built up through the years. Sawmill machinery and special machinery of all kinds are manufactured. Spare parts for paper mills, including cut gears, have been another product for many years. The firm has a reputation not only for fine castings, but for precision machine work of all kinds.

In 1882 a thoroughly trained foundryman, Samuel Morrow, arrived in Oregon. He had been a leading molder in the Pusey-Jones plant in Wilmington, Del., maker of papermaking machines for more than 100 years. Papermaking had begun in Oregon in 1867, and by the eighties had made considerable progress. Mr. Morrow for a time acted as foreman molder for Union Iron Works and Wolfe-Zwicker Iron Works.

In the late eighties, in company with Fritz Wolff and Louis Steinhauser, Mr. Morrow founded the Phoenix Iron Works on Hawthorne

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SYNOL C-2 gives you these engineered advantages

- Reduced coremaking man hours
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Horace G. Stults	York, Pennsylvania
Western Foundry Sand Company	Seattle, Washington
Walter A. Zeis	Webster Groves, Missouri
Don Barnes Foundry Supplies & Equip.	Hamilton, Ontario, Canada

Avenue, which is now the center of a thriving business district. The buildings which housed the foundry and machine shop were of clapboard construction. After a few years, as the business developed, a tract of land was acquired, with the idea of moving the entire plant out of the business district. The only building erected on the newly purchased property, however, was the larger foundry, and the machine shop still operates at the same old stand.

Many intricate castings for the paper industry have been made at Phoenix Iron Works under Mr. Morrow's supervision and that of his successors. During World War I Phoenix made something of a record with castings for inverted vertical marine engines in common use at that time.

Mr. Morrow also acted as foundry consultant for various Portland foundries. He died in 1926 and his place was taken by two nephews trained under him, both of whom have since died. Present officers of Phoenix are W. J. Steinhauser, president; H. Fox, secretary-treasurer; and Fritz Wolf, in charge of sales.

Wood-Ewing Iron Works in East Portland closed some 30 years ago. Dick Wood, of Wood-Ewing Iron Works, formed the Industrial Iron Works and sold out to Huffschmidt interests in 1923. The Huffschmidts also own the Western Foundry Co., which was started during World War I. It is a prominent producer of sawmill and pulp and paper mill castings.

In the early days most foundries operated their own pattern shops. Today they depend largely on nearly a score of job shops for patterns. The leading ones are Peerless Pattern Works and West Side Pattern Works, operated by A. L. Evans, son of Fred Evans, who founded the shop over 50 years ago.

The first steel foundry in Oregon was Columbia Steel Foundry, a branch of one of the same name in California. Today, Columbia Steel Casting Co. is a unit of U. S. Steel and produces castings up to 10 tons in size. Officers are Hobart M. Bird, president; Helen M. Bird, vice president; and Matthew E. Haldeman, secretary-treasurer.

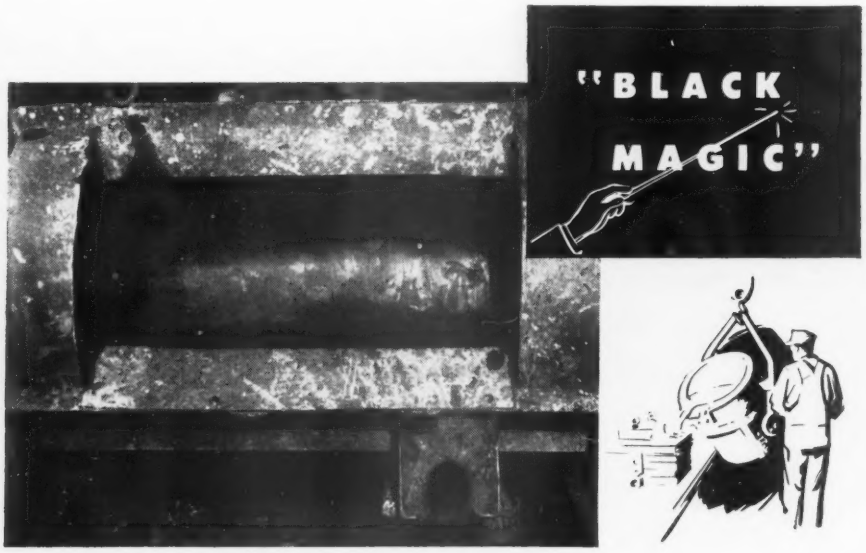
Steel Foundry Is Largest

Oregon's largest foundry is Electric Steel Foundry Co. It had its roots in the Portland Bronze & Crucible Steel Foundry, started in Portland in 1906 by the late Leonard and Charles Shad. Portland Bronze was completely destroyed by fire in 1912. In 1913 Leonard Shad and the late C. F. Swigert started Electric Steel Foundry. Mr. Shad was the first president of Electric Steel and his brother Charles was the first superintendent.

Present officers of Electric Steel are Charles F. Swigert Jr., chairman of the board; Newman Ward, president; E. G. Swigert, vice president; Clarence E. Buchner, secretary-treasurer; and Robert A. McDonald, plant manager. The Swigert family has other extensive holdings on the Pacific Coast, including Pacific Bridge Co. of San Francisco and Portland, and the Hyster Co., Portland.

Electric Steel, with a monthly capacity of about 1000 tons, specializes in production of castings for pulp and paper mills, aircraft, dredging, mining, agriculture, atomic energy and many other industries.

Peerless Pattern Works is operated close by Electric's main plant as a subsidiary. Besides doing all pattern work for Electric Steel, it does a general jobbing business in one of the largest and best equipped pattern shops in the Northwest. New-



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Walsh also makes—Graflok Ladle Coating. In dry form, in 100 lb. waterproof bags, ready for immediate use by the addition of water.

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man Ward is president; Orville K. Buckner, vice president; and Mrs. Guenn Pape, secretary. Mrs. Pape's late husband founded the Peerless Pattern Works.

Electric Steel recently has had under construction a three-story research laboratory and employee's building. The company maintains an engineering and research staff, and the new building will permit expansion of the research program the firm conducts.

Field Director Appointed By Gray Iron Founders

Gray Iron Founders' Society is strengthening its management and cost group program with the appointment of a field director, a new full-time staff position.

The new director, E. Harold Mitchell, will spend most of his time in

E. HAROLD MITCHELL

the field working closely with officers of management and cost groups and with the regional cost consultants. His principal duty will be to assist the groups in planning local and regional meetings. The society also plans to organize new groups in areas not now served.

Mr. Mitchell was graduated from the University of Georgia in 1943 and served in the Navy during the war. Recently he has been located in Detroit as sales engineer for the Weatherhead Co., Cleveland.

Shell Process Inc. Appoints Nine Representatives

Nine new manufacturers' agents have been appointed by Shell Process Inc., McKinstry Ave., Chicopee, Mass., to distribute the company's shell molding machines, shell bonders, core blowers and allied equipment for the foundry industry. The new appointments are as follows: Thomas Barr, W. Thomas Barr Associates, P. O. Box 5832, Birmingham, for Alabama, Florida, Georgia, Louisiana, Mississippi and Tennessee; Fred W. Fuller, Fred W. Fuller Co., 1010 Euclid Bldg., Cleveland, for Ohio; Herbert H. Klein, Klein-Ferris Co., 683 Atlantic Ave., Boston, for New England; Robert F. Guion, P. O. Box 7304, Indianapolis, for Indiana; Joseph G. Risney, Risney Foundry Equipment Co., Box 216, Brookfield, Wis., for Minnesota, Wisconsin, and the upper Michigan Peninsula.

Others include: Edwin A. Swensson, Edwin A. Swensson Co., 2970 West Grand Blvd., Detroit, for balance of Michigan; E. C. Troy, E. C. Troy Equipment Engineers, Palmyra, N. J., for Delaware, Maryland, New Jersey, eastern Pennsylvania, Washington, D. C., and southeastern New York; H. Howard Updegraff, 1403 Oliver Bldg., Pittsburgh 22, for West Virginia and southwestern Pennsylvania; Otto Rosentreter, 8411 State St., South Gate, Calif., for California, Arizona, Oregon, Washington, Idaho, Utah, and Nevada.

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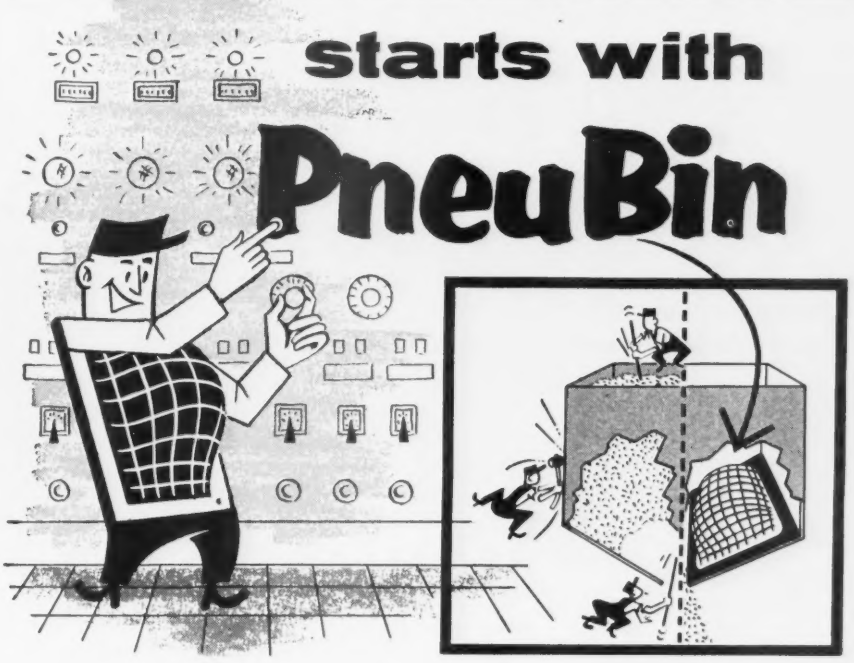

Pulsating Panels assure constant material flow from bins and hoppers

Automation is an empty word if your production is interrupted by material hang-up in bins and hoppers. That all-important initial step of material introduction must move smoothly, flawlessly or the whole concept of automation is destroyed. PneuBin will solve your flow stoppage problems and reduce your operating expense. The PneuBin unit consists of steel-backed, neoprene, pulsating panels mounted on the inside walls of your present bins, and air controls to regulate the panels' action. By the pneumatic inflation of the PneuBin panels, the bin contents are positively displaced to insure free flow. Automatic inflation and deflation continues in cycles at whatever frequency is set on adjustable control. PneuBin operates off the regular plant air supply.

PneuBin decreases plant operating costs by reducing maintenance and adding to the life of your bins; insures constant material flow; and greatly increases personnel efficiency through its quiet operation.

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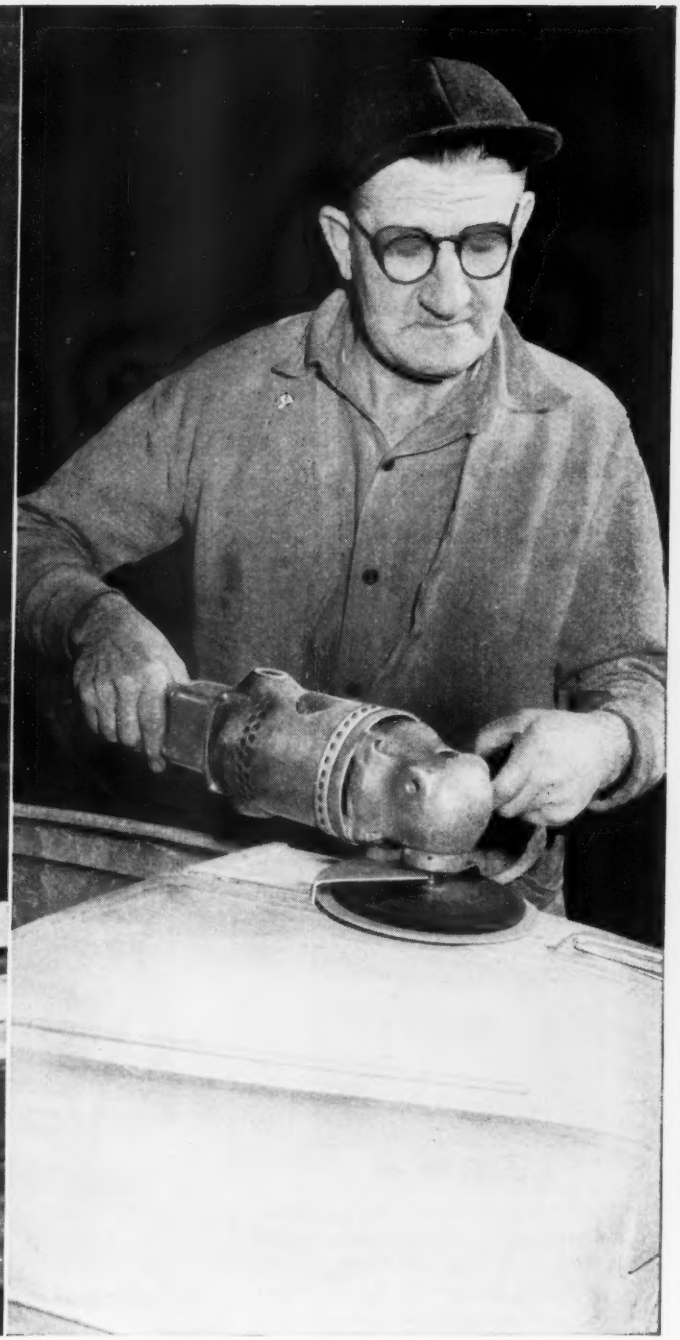

Blending welds with depressed center wheel

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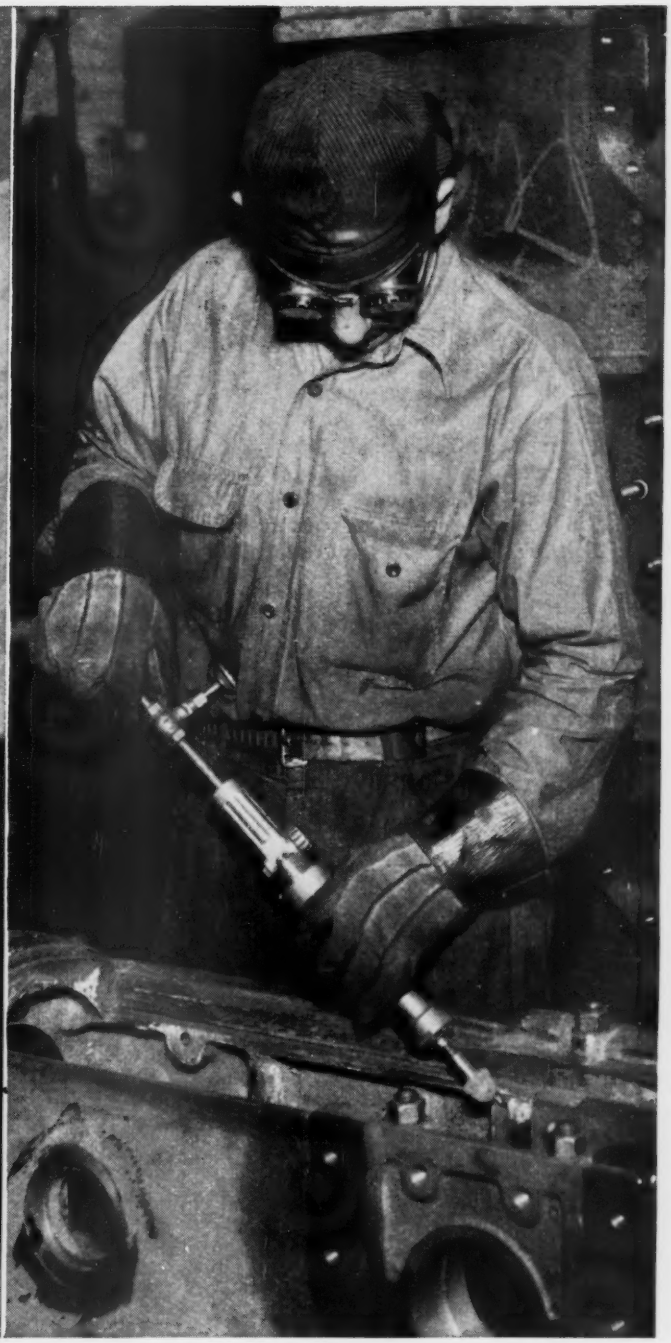
Rough grinding with cup wheel



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Programs of Future Meetings

Market Problems To Be Topic At Steel Founders' Meeting

"A Healthy Steel Foundry Future" will be the theme of the 53rd fall meeting of the Steel Founders' Society of America at the Greenbrier, White Sulphur Springs, W. Va., Oct. 24-25. A. J. McDonald, president of the society and vice president of American Steel Foundries, Chicago, will preside at all sessions.

President McDonald will open the Oct. 24 session with a talk entitled "Half the Battle." He will detail the planning which has been underway throughout 1955, in accordance with the report of the Program Appraisal Committee delivered by its chairman, Claude L. Harrell, president, Sterling Steel Casting Co., at the 1954 fall meeting.

The session will continue with Executive Vice President F. Kermit Donaldson speaking on "Executive Responsibility in Today's Business World." Chauncey Belknap, legal counsel of the society, will cover developments in this field as they affect the steel castings industry.

Roy A. Foulke, New York, vice president of Dun & Bradstreet, will deliver the feature address for the session entitled "Ratios Can Get You." He will compare ratios of the casting industry with others and demonstrate how these can be used as a business control tool by top management. Mr. Foulke is the author of several books on business and financial subjects.

The market for steel castings will receive the full attention of the Tuesday morning session. Chairmen of the society committees on market research, technical research, product development and advertising, public relations and education will describe the proposed activities of their respective groups in relation to the market development program of the society. These Chairmen are, respectively: Allen M. Slichter, president, Pelton Steel Casting Co., Milwaukee; H. D. Phillips, vice president, Adirondack Foundries & Steel Inc., Watervliet, N. Y.; W. H. Muchnic, president, Locomotive Finished Material Co., Atchison, Kans.; W. H. Worrilow Jr., vice president, Lebanon Steel Foundry, Lebanon, Pa.

The speakers will then serve as a panel for the second half of the session under the leadership of President McDonald as moderator. The purpose of this panel will be to investigate the wishes and ideas of the membership in the further development of market activities.

Earle M. Layman, director of personnel, General Steel Castings Corp., Granite City, Ill., chairman of the national Safety Committee, will join with President McDonald in awarding the certificates won by various companies in the 1955 safety contest of the society. These awards are made for zero frequency, and for outstanding records in each of the four manhour classifications.

An industry banquet will be held Monday evening.

GRAY IRON MANAGEMENT: Officers of the Chicago and Wisconsin Management Groups of the Gray Iron Founders' Society are shown here. Chicago officers, left to right, are: C. N. Outman, Hansell-Elcock Co., treasurer; W. I. Harshbarger, Hansell-Elcock Co., secretary; J. M. Gajentan Jr., Chicago Foundry Co., chairman. Wisconsin officers, right to left: I. O. Heatwole, J. E. Gilson Co., chairman; J. E. Burke, Wisconsin Gray Iron Foundry Co., secretary; L. M. Sanford, Motor Castings Co., treasurer. In center, left to right, are Don Workman, GIFS executive vice president, and C. H. Ker, national president of the society. The management groups met jointly recently in Waukegan, Ill.

Ohio Foundry Conference Is in Cleveland, Oct. 20-21

"Better Castings for Better Living" is the theme of the seventh Ohio Regional Foundry Conference, to be held on the Case Institute of Technology campus in Cleveland, Oct. 20-21. Case is co-operating with the Ohio chapters of American Foundrymen's Society in sponsoring the event.

Sessions will be held in several Case buildings, with registration headquarters in Tomlinson Hall. The conference dinner Thursday evening, Oct. 20, is at Tudor Arms Hotel, Carnegie Ave. at East 107th St., Cleveland, adjacent to the Case campus.

Lewis T. Crosby, Sterling Wheelbarrow Co., Cleveland, is general conference chairman. Jack F. Wallace, Case, is associate chairman. Program arrangements are under the direction of Alexander D. Barczak, Superior Foundry Inc., Cleveland.

H. A. Biddinger, F. E. Myers & Bro. Co., Ashland, O., Canton District chapter chairman, is in charge of the gray iron program. Malleable iron sessions are under the direction of N. H. Keyser, Battelle Memorial Institute, Columbus, O., chairman of Central Ohio chapter.

Toledo chapter chairman, C. E. Eggenschwiler, Bunting Brass & Bronze Co., Toledo, O., is in charge of steel sessions. Nonferrous meetings are directed by J. A. Sheley, Black-Clawson Co., Hamilton, O., Cincinnati District chapter chairman.

Program details follow:

Thursday, Oct. 20

9 a.m.—Registration opens: Tomlinson Hall.

10 a.m.—*General Session:* Welcome address by Pres. T. Keith Glennan, Case Institute of Technology. "Applied Research and Development in the Foundry Industry," T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va.

12:15 p.m.—*Luncheon:* Tomlinson Hall. "AFS Highlights," Bruce Simpson, National Engineering Co., Chicago, and national AFS president.

Gray Iron

2 p.m.—"Shell Molding and Shell Cores," William J. White, Shallway Corp., Connellsville, Pa.

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Manufacturers of Turbo-Compressors and Heavy Duty Vacuum Cleaners

3:30 p.m.—"Cupola Operation," Karl G. Presser, Gray Iron Research Institute, Columbus, O.

Malleable Iron

2 p.m.—"Safety," A. C. Hensel, Albion Malleable Iron Co., Albion, Mich.
3:30 p.m.—"Refractories for Malleable Melting and Annealing," R. A. Witschey, A. P. Green Fire Brick Co., Mexico, Mo.

Steel

2 p.m.—"Steel Castings vs. Forgings," John B. Caine, technical consultant, Cincinnati.
3:30 p.m.—"Melting Practice for Quality Steel Castings," A. Gross, Ohio Steel Foundry Co., Springfield, O.

Nonferrous

2 p.m.—"Elimination of the Most Common Defects Found in a Nonferrous Foundry," William Ball Jr., R. Lavin & Sons Inc., Chicago.
3:30 p.m.—"Some New and Different Ideas Pertaining to Nonferrous Synthetic Sands," William Ball III, Hill & Griffith Co., Cincinnati.

6 p.m.—*Cocktail Hour:* Tudor Arms Hotel.
7 p.m.—*Conference Banquet:* P. R. Reid, director of civic affairs office, Ford Motor Co., Detroit, speaker.

Friday, Oct. 21

8:30 a.m.—Registration opens: Tomlinson Hall.

Gray Iron

9 a.m.—"High Pressure Molding," T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemicals Corp., Chicago.
10:30 a.m.—"Exothermic and Insulating Materials," Michael Bock II, Exomet Inc., Conneaut, O.

Malleable Iron

9 a.m.—"Casting Defects," Emil Romans, National Malleable & Steel Castings Co., Cleveland.
10:30 a.m.—"Cleaning Malleable Castings," E. M. Strick, Erie Malleable Iron Co., Erie, Pa.

Steel

9 a.m.—"Practical Application of Riser Calculations," H. F. Bishop, Naval Research Laboratory, Washington.

10:30 a.m.—"Practical Applications of Moldable Exothermic Compounds in Steel Foundries," J. E. Gotheridge, Foundry Services Inc., Columbus, O.

Nonferrous

9 a.m.—"Gating and Risering of Nonferrous Castings," C. V. Knobloch, R. Lavin & Sons Inc., Chicago
10:30 a.m.—"The CO_2 Process," J. Reedy, Delhi Foundry Sand Co., Cincinnati
12:15 p.m. — *Luncheon:* Tomlinson Hall. "Something New in Communications," R. C. Clark, Bell Telephone Co., Cleveland
2 p.m.—*General Session.* "Patternmaking," George W. Schuller Jr., Caterpillar Tractor Co., Peoria, Ill.

Foundry Equipment Builders Plan for Annual Meeting

Three days of business sessions are scheduled for the 37th annual meeting of the Foundry Equipment Manufacturers Association at the Greenbrier, White Sulphur Springs, W. Va., Oct. 13-15.

Meetings of the association's six product groups will be held the first day, with general sessions to be held on Friday and Saturday. The annual banquet will be held Friday evening.

Program details follow:

Thursday, Oct. 13

8 a.m.—Registration.
10 a.m.—Product group meetings.
2 p.m.—Product group meetings.
6:30 p.m.—Reception.

Friday, Oct. 14

9:15 a.m.—Annual business meeting. President W. B. Wallis, Pittsburgh Lectromelt Furnace Corp., chairman.
Report of the executive secretary—C. R. Heller
Election of directors.
"Interpretation of FEMA Statistical Reports"—Einar A. Borch, National Metal Abrasive Co.
12:30 p.m.—Board of directors luncheon.
6:30 p.m.—President's reception and annual banquet.

Saturday, Oct. 15

9:15 a.m.—General session. Vice President D. E. Davidson, Link-Belt Co., chairman.
"Rate of Activity in the Foundry Equipment Industry"—Einar A. Borch.
"What Foundry Management Expects of the Foundry Equipment Industry"—Frank X. Bujold, Ford Motor Co.
2 p.m.—General session. Vice President D. E. Davidson, chairman.
Report on National Castings Council—Frank G. Steinebach, FOUNDRY.
Report on Foundry Educational Foundation—E. C. Hoenicke, Eaton Mfg. Co.
Presentation of officers for ensuing year.

Purdue Schedules Conference On Metals Casting, Nov. 3-4

Six papers are included in the technical program for the annual Metals Casting Conference to be held at Purdue University, West Lafayette, Ind., Nov. 3-4. The meeting is being sponsored by the university and the Central Indiana and Michiana Chapters of the American Foundrymen's Society.

Subjects to be covered include sand and melting practices, gas in metals, risering and humanics. Robert Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich., is program chairman of the conference.

Other committee members in

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charge of conference arrangements are: Dr. R. Schuhmann, Prof. C. T. Marek, Prof. R. W. Lindley and K. E. Glancy, Purdue; R. Voorhees, Buckeye Products Co., Mishawaka, Ind.; W. E. Patterson, Elkhart Foundry & Machine Co., Elkhart, Ind.; James C. Maggart, Sibley Machine & Foundry Co., Mishawaka, Ind.; Carl Schopp, Link-Belt Co., Indianapolis; Stephen Taylor, Electric Steel Casting Co., Indianapolis; Victor J. Obrig, Fabricast Division, Bedford, Ind.

The tentative program:

Thursday, Nov. 3

9 a.m.—Registration.

10 a.m.—Conference opens with welcome by Dr. A. R. Spalding, Engineering Department, Purdue University. Response by Frank Shipley, Caterpillar Tractor Co. **"Fundamentals of Humanics."** Ralph L. Lee, Lee Hobby Foundry, Birmingham, Mich.

1:30 p.m.—O. Jay Myers, technical director, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland—A report to industry on what has been accomplished by the various committees of the AFS Sand Division, of which Mr. Myers is chairman.

3 p.m.—**"Gas in Metals."** Prof. Norman Parlee, Metallurgy Department, Purdue.

6 p.m.—Banquet. Speaker, Prof. M. B. Ogle, Purdue.

Friday, Nov. 4

10 a.m.—**"Principles of Risering."** Charles Walton, technical director, Gray Iron Founders' Society, Cleveland.

11:15 a.m.—**"Control of Metal in Melting,"** Phillip Semler, Auto Specialties Mfg. Co., St. Joseph, Mich.

1:30 p.m.—**"Molding Sands,"** Earl Woodliff, Foundry Sand Service Engineering Co., Detroit.

3 p.m.—Closing remarks by C. T. Marek, Purdue University, and J. P. Lentz, Indianapolis Works, International Harvester Co., Chicago.

Extensive Program Scheduled At National Metal Congress

The 37th National Metal Congress and Exposition will be held in Philadelphia, Oct. 17-21, under sponsorship of the American Society for Metals. As in recent years the meeting will include an extensive technical program as well as a large display of metallurgical processes and products at the Metal Show in Convention Hall.

Several other societies are co-operating with the ASM in presenting technical sessions. The Society for Nondestructive Testing has arranged a program for the first four days of the week. Monday's session will include discussions of various forms of nondestructive testing, including radiography, magnetic particle, ultrasonic, penetrant and eddy current. Among the speakers will be:

Carl E. Betz, W. E. Thomas and Hamilton Migel, Magnaflux Corp., Chicago; Royal G. Tobey, Eastman Kodak Co., Rochester, N. Y.; John C. Smak, Sperry Products Inc., Danbury, Conn.; Peter K. Bloch, Branson Instrument Co., Stamford, Conn.; J. B. Morang, Aluminum Co. of America, New Kensington, Pa., and James H. Bly, X-Ray Inc., Detroit.

Other sessions will be devoted to production testing, aircraft inspection, marine inspection, ordnance inspection and inspection of castings, forgings and weldments.

Latest developments in several fields of heat treating will be discussed at a Tuesday and Wednesday symposium sponsored by the Industrial Heating Equipment Association in co-operation with ASM.

The first session, to be held Tuesday afternoon, will be on the general theme "Furnaces, Combustion

HOW TO DO IT

Plywood Frame Aids in Making Half Green—Half Dry Sand Core

By L. H. BAKER
Mabry Foundry & Machine Co.
Beaumont, Tex.

HERE'S a trick that might come in handy for green capping of cores. Equipment consists of a conventional corebox for making half a core, Fig. 1, and a ¼-in. plywood frame, Fig. 2, with inside contour to match the corebox cavity. It also has dowel pins to fit guide holes in the corebox. The box is filled with green molding sand, rammed and struck off as usual. Then the frame is placed on the box. Next, a previously made dry, oil sand half core is placed in the frame as shown in Fig. 3A, where it is aligned properly with the green sand portion of the core.

The box, frame and core are rolled over and placed on a plate which contains a jig or some loose sand to keep the core assembly from rolling off. When the box and frame are removed, Fig. 3C, the core assembly is ready to be set in the mold.

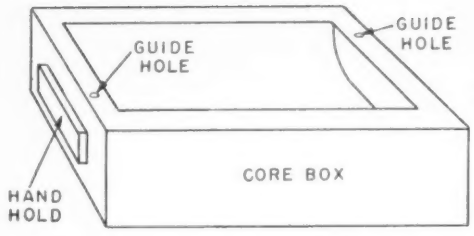

FIG. 1

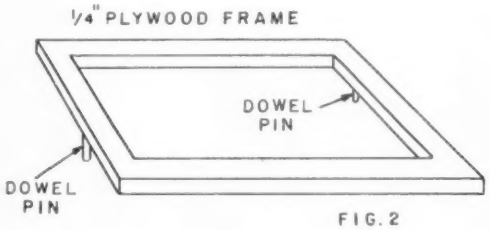

FIG. 2

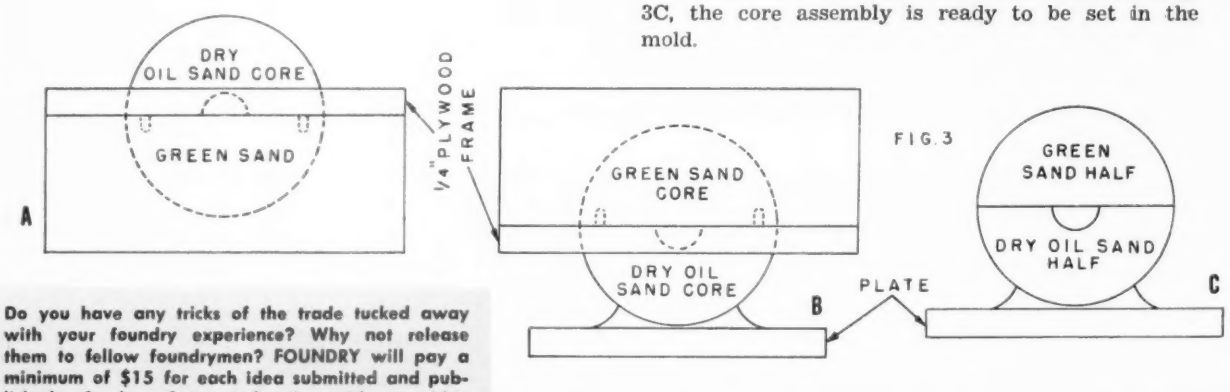

FIG. 3

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

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Equipment and Induction Heating." Speakers will be: Frank Chesnut, Ajax Electrothermic Corp.; Floyd Olmstead, Lee Wilson Engineering Co., and Fred Bloom, Bloom Engineering Co.

The second session, Wednesday afternoon, will have the general topics of "Mechanized Heat Treating Equipment and Its Application" and "Metallurgical Aspects Associated with Induction Heating." The speakers will be: L. Rosseau, Ajax Electric Co.; Martin Neumeyer, Sunbeam Corp.; G. McCormick, Industrial Heating Equipment Co., and Dr. Harry Osborn, Tocco Division, Ohio Crankshaft Co.

Gray Iron Founders To Meet In Milwaukee, Oct. 19-21

Twenty-seventh annual meeting of the Gray Iron Founders' Society will be held Oct. 19-21 at Hotel Schroeder, Milwaukee. A two-day business session includes in its program a number of discussion topics of particular interest to gray iron foundrymen. These include such subjects as market expansion, safety, costs and labor relations.

In addition to talks by guest speakers, chairman of the society's various committees will report on the past year's activities. The president's reception and dinner is scheduled for Wednesday evening, with the annual business meeting getting under way Thursday morning. The annual industry banquet will be held Thursday evening, and a special entertainment program is planned for the ladies during the three days.

Program details follow:

Wednesday, Oct. 19

9:30 a.m.—Meeting, retiring board of directors.
6:30 p.m.—President's reception and dinner.

Thursday, Oct. 20

8 a.m.—Registration.
9:30 a.m.—Annual Business Meeting:
Report of the president—Charles H. Ker, Dalton Foundries Inc., Warsaw, Ind.
Report of the treasurer—Walter O. Larson, W. O. Larson Foundry Co., Grafton, O.
Report of the executive vice president—Donald H. Workman.
Report of the technical director—Charles F. Walton.
Presentation of committee reports.
11 a.m.—Final report, Program Evaluation Committee, C. R. Culling, chairman.
12:30 p.m.—Industry luncheon—Speaker, Hon. Carl Oechsle, Deputy Assistant Secretary of Commerce for Domestic Affairs, U. S. Department of Commerce, Washington.
2 p.m.—Business session:
Panel discussion, **"How We Can Expand Our Markets."** Moderator, Dr. Ira D. Anderson, president, American Marketing Association, and associate dean, School of Commerce, Northwestern University, Evanston, Ill. Speakers, Robert J. Eggert, marketing research manager, Ford Division, Ford Motor Co., Dearborn, Mich., and Bay E. Estes, director of commercial research, U. S. Steel Corp., Pittsburgh.
Discussion period. Summary by Dr. Anderson.
4:15-5:15 p.m.—GIFS committee meetings.
7:30 p.m.—Industry banquet.

Friday, Oct. 21

8 a.m.—Registration.
9:30 a.m.—Business Session: **"The Top Executive Looks at Safety,"** Clifford L. Chatterton, supervising engineer, Liberty Mutual Insurance Co., Pittsburgh. **"The GIFS Cost Program in Canada,"** Robert B. Hill, industrial engineer, Canada Iron Foundries Ltd., Montreal, Que. **"1955—A Most Historical Year in Labor Relations,"** Lee S. Shaw, partner, Seyfarth, Shaw & Fairweather, Chicago.
12:30 p.m.—Industry luncheon — Presentation of new officers and directors, 1955 citations and awards, and 1955 redesign contest awards. Speaker, Maj. Norman Imrie, public relations representative, Smith Agricultural Chemical Co., Columbus, O.
2:30 p.m.—27th annual meeting adjourns.

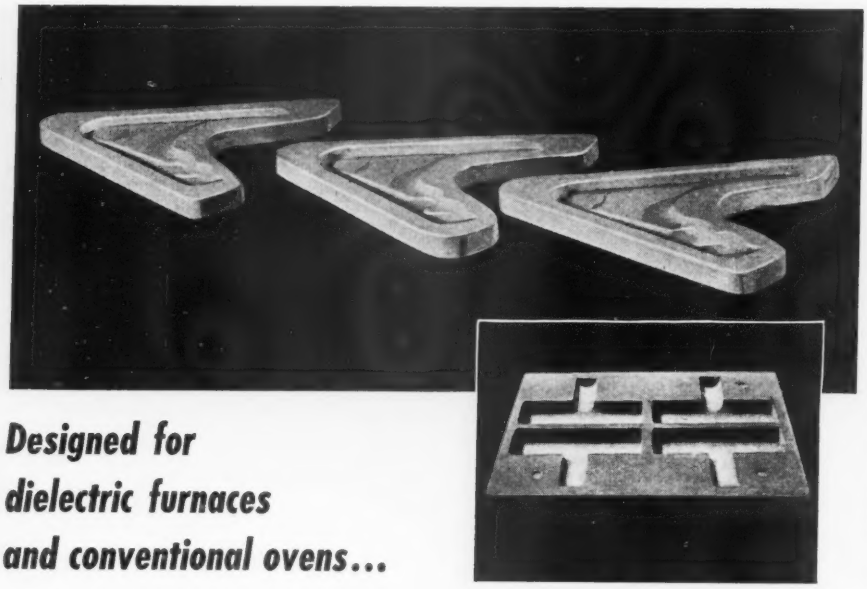
Saturday, Oct. 22

9:30 a.m.—Meeting, new board of directors.

Book Review

The New American Machinist's Handbook, edited by Rupert LeGrand, 1572 pages, over 1000 illustrations, published by McGraw-Hill Book Co., 330 West 42nd St., New York 36. Price $11.

One-volume book is an almost completely rewritten and reorganized edition of *American Machinist's Handbook.* Tables, formulas and up-to-the-minute information on modern metalworking methods, material and equipment is available for ready reference for machinists, designers, draftsmen and engineers. All the processes involved in manufacturing a metal product from raw material to the final result are covered in detail.



Designed for dielectric furnaces and conventional ovens...

J-M Pallite Plates and Form Driers afford desirable operational advantages

Service records prove that Johns-Manville Pallite outperforms and outlasts many other materials in use in dielectric type furnaces. The advantages of Pallite are due to its special formulation, developed by Johns-Manville for use in dielectric furnace core-drying operations in foundries. Pallite offers the following desirable characteristics:

- light weight
- uniform electrical conductivity
- uniform thermal conductivity
- dimensional stability
- nonsweating
- moisture-absorbent

Pallite Plates are now available in both flat and grooved form. Pallite Form Driers are also available, contoured to support irregular shaped cores properly during their travel through the furnace. For details about J-M Pallite materials, write Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit (Toronto), Ontario.

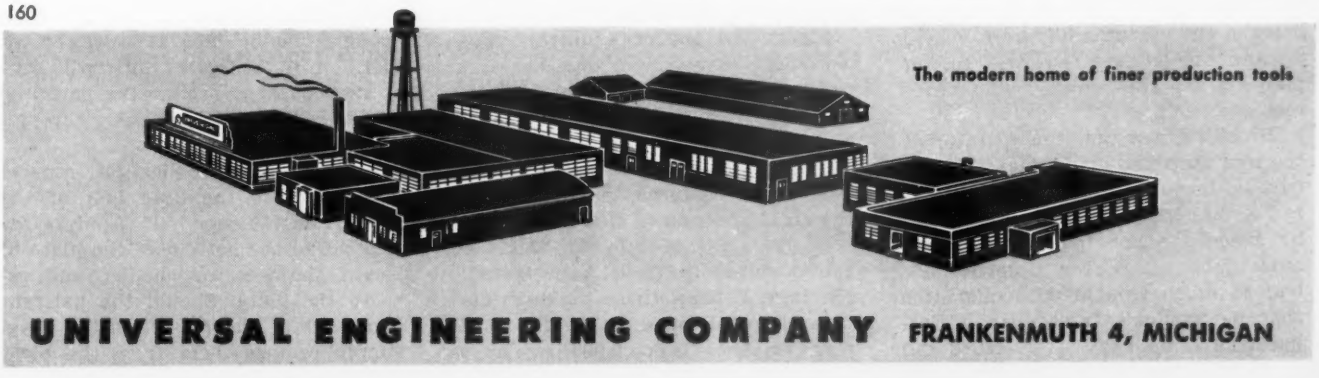
JM PRODUCT — **Johns-Manville PALLITE**

YOU SAVE TIME WITH UNIVERSAL

THREADED FLASK PINS AND BUSHINGS

Universal Flask Pins and Bushings save precious minutes of production time because they assure instant, accurate alignment of cope and drag. And they also save down-time because, being heat-treated and precision ground from fine quality steels, they stand up under rough treatment and give long, satisfactory service. Universal threaded series Flask Pins and Bushings are used in steel, aluminum, magnesium or other light metal flasks. Bushings are available in both the round and elongated types; pins in both round and hexagonal types. Universal carries a complete line of sizes of its threaded series as well as its taper and plain series Pins and Bushings as regular stock items. For further information write to the Universal Warehouse nearest you — 1060 Broad St., Newark, N. J., 5035 Sixth Ave., Kenosha, Wisc., or the home office.

160

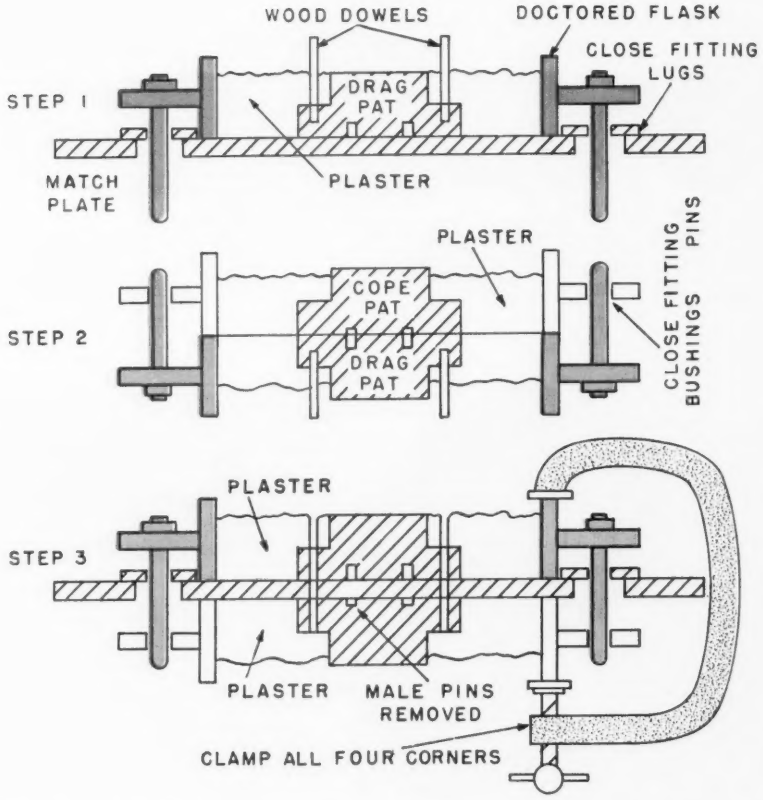


UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN

Trouble Shooting

By C. W. AMMEN

How to Mount Patterns



Drawings show steps in mounting pattern. Step 1—Locate and glue down drag patterns, plug mounting holes and pour plaster. Step 2—Remove plate, fit cope patterns to drag patterns and pour cope plaster. Step 3—Remove halves of flask containing plaster, patterns and plate plugs; drill mounting holes

DEAR CHARLIE:

Now and again we seem to slip up in making a matchplate or cope and drag equipment. When we are drilling mounting holes through the plate and patterns, the drill often runs off on an angle, or something else we do causes a mismatch. Have tried the brass transfer plate system, and the same thing goes wrong. The cope and drag mounts really give us a fit. What, in your opinion, is about the easiest or safest way to mount patterns to get a really close match without knocking ourselves out in the process?

Sincerely,
SAM

DEAR SAM:

Talking about patterns and pattern mounts reminds me of a job we had some time back in a brass shop. The castings consisted of component parts for a steering engine. Two of the patterns called for ten castings each in gray iron. Since the two patterns were flatbacks, we mounted them on a piece of plywood to fit a standard 12 x 18-in. steel or snap and sent it out to a local gray iron shop for castings.

When the castings and patterns came back, the patterns were separate from the plywood. The screw holes in the patterns had been waxed up and the parting face was full of pike marks. The plywood had never seen the sand.

We all figured that the operator at the iron shop had made them up loose with a larger job, but he hadn't, I ran across him some time later, and he asked me not to send him any more jobs on boards because he'd had so much trouble with mismatch that he wouldn't trust even a flatback.

The brass plate method of transfer is an old one and, if done with enough care, usually will do a good job. It is my opinion, however, that the use of a suitable transfer frame or flask and plaster is by far the easiest method of getting a close match.

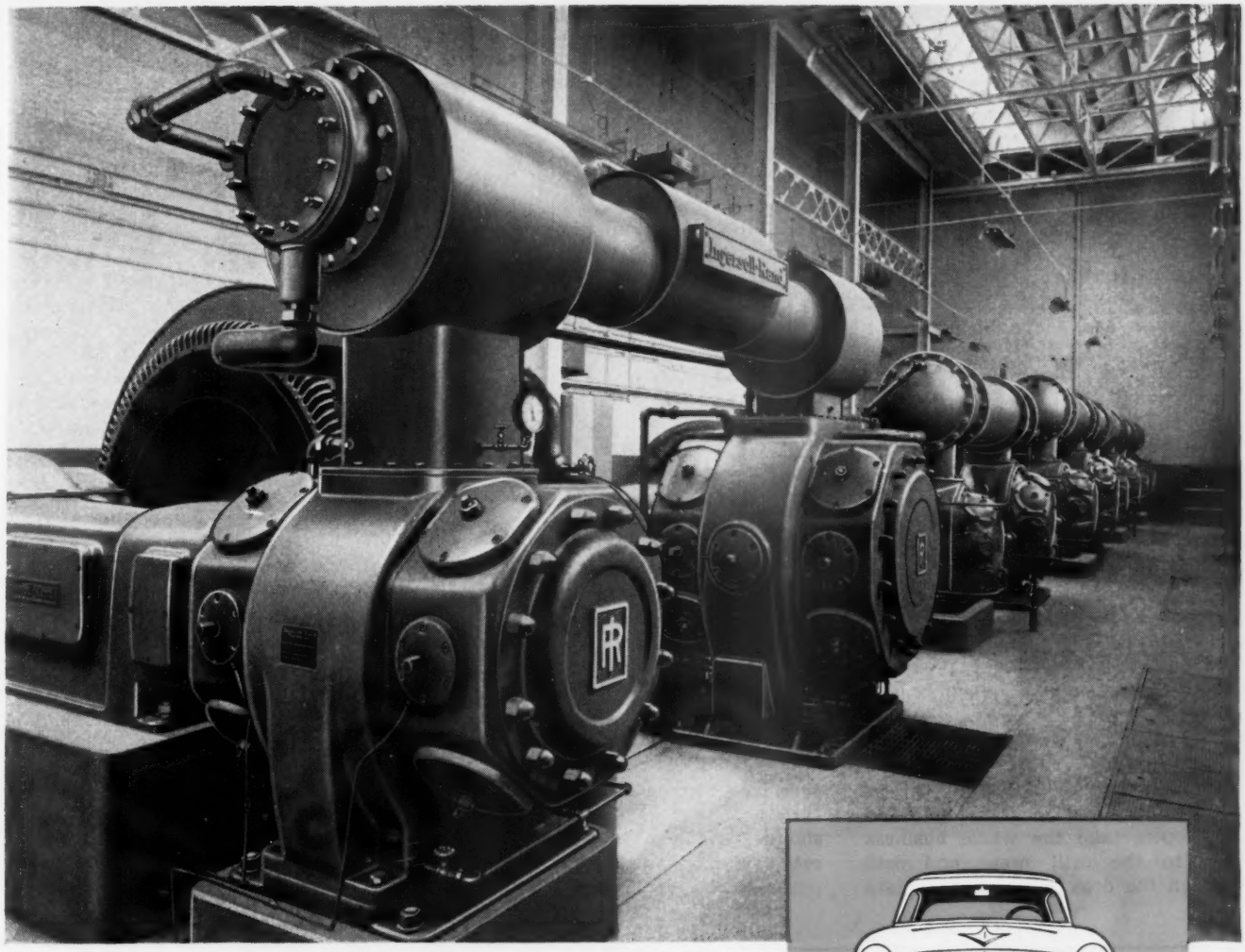
This system is simple, cheap and pretty close to foolproof. Take a 12 x 18 in. flask, for example, and mount patterns on a plate for use in it. Remove the bushings from both ends of the cope and rebush the flask with tight bushings, both round. Allow only about 0.003-in. clearance between pin and bushing. Alternatively, you can design, cast and machine up a special aluminum flask with a close fit between the pins and the bushings.

Finish the patterns in the usual manner, pinning them together as if you were going to use them for loose molding, with one exception. In the drag-half patterns, drill suitable holes through the prints, etc., to use to mount the patterns to the plate in the final go-around. Next, fit a suitable 12 x 18-in. aluminum plate to the doctored-up flask with suitable pin lugs, holding these pin lugs also to a close tolerance, as we did in fitting up the flask—0.003 in. or so clearance between the lugs and the pins.

Place cope and drag flask together, with the plate between, and turn the entire rig so that the drag side is up. Locate the drag patterns on the plate where you want them with respect to gating, etc., gluing them in place with shellac or wax. Place suitable dowels in the holes you drilled, for use later during mounting. These dowels should stick up out of the pattern not less than an inch or so.

With the drag patterns properly located and stuck down to the plate, with plugs or dowels in the mounting holes, place a weight on each corner of the flask and to the surface of plate and patterns apply a good commercial plaster release. Pour enough plaster into the drag flask to fill it to a depth which will give a good coverage around the patterns, yet leave the dowels sticking through the plaster.

After the plaster has set, remove the plate and the drag half of the flask from the cope half. Apply a little heat to the bottom of the plate to loosen the wax or shellac, and remove the plate. Should the patterns come out of the plaster in the drag, simply remove them from the plate



Streamlined Air Power Plant

behind the streamlined NEW HUDSON

Modernized compressor room at Hudson Division of American Motors simplifies operation and maintenance

AT Hudson, improvement of plant and product go hand-in-hand.

Here, the compressed air plant previously consisted of one steam- and four electric-driven compressors, in three different locations. The old steam-driven unit, which had out-lived its value as a dependable standby, was replaced by a new Ingersoll-Rand 3,000 cfm PRE compressor. All five electric-driven compressors were then installed in a single building, with receivers and aftercoolers in the basement directly below. This compact installation is shown above, with the new PRE unit in the foreground. The four other compressors are also Ingersoll-Rand PRE units. Although more than 25 years old, they were found to be in such excellent running condition throughout that there was no need for replacement.

Wherever you need thoroughly dependable, low-cost air power, it pays to specify Ingersoll-Rand. Your I-R representative will be glad to show you why—and give you full details on any type of air or gas compressor. Helping you is his business!

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COMPRESSORS • CONDENSERS • AIR & ELECTRIC TOOLS • PUMPS • ROCK DRILLS • GAS & DIESEL ENGINES

and reseat them in their respective cavities. The drag then is turned over on its back, parting face up. Clean off patterns and top carefully and place the cope halves of the patterns over their mating halves, which are imbedded to the parting line in plaster in the drag of the special flask. Place the cope on the drag, weighting all four corners with a suitable weight.

Apply a plaster parting or plaster release over the entire surface of the plaster and the cope halves of the patterns. Then pour sufficient plaster into the cope to give good coverage around the cope patterns. Since you have no dowels to worry about, you can cover the patterns up. Part the two flasks, and the cope half will contain the cope halves of the patterns, and the drag half will contain the drag halves.

Next, return to the aluminum matchplate, fitted with suitable lugs as mentioned before, and replace the cope half. Roll the whole works over to bring the drag up, and clamp all four corners. The clamp should extend from the cope or top of the flask to the bottom of the drag half. With the flask in the upside-down position, remove the plugs or dowels in the holes for mounting. Leaving these holes open, take the whole business over to the drill press and drill through the drag patterns, the plate and the cope. Chip the plaster away until you get down to the pattern. Then drive pins through or screw them down. There are many variations of the method, but this is the basic principle. Then remove the special flask and the plaster, leaving the patterns with a very close register. Also remove the special lugs from the plate and mount whatever type of lugs you are using.

This rigging, done in the same manner, is suitable for making cope and drag mounts, and it also will work in the mounting of a symmetrical match when the flasks are fitted up with a pin on one end and a bushing on the opposite one. This is the type of equipment used on a pin-lift or stripper, in which the first half off, the drag, is turned end-for-end, and the second half becomes the cope. It is used in some plumbing shops and in shops which engage in high production of small and medium castings. The plaster transfer system for mounting these symmetrical matches is used widely in this type of work.

Although a new 12 x 18-in. steel flask which has been rebushed can be used, I would recommend that you construct a special pattern-mounting frame. This frame, or pair of frames, should be machined up very accurately in a tool and die shop. Special pins and bushings can be made, and you will find this equipment to be more suitable.

In most cases you require only about 2 or 2½ in. of depth per section since it is not necessary for the plaster to cover the entire pattern. Only enough plaster is necessary to grip the pattern and hold it in position until it is mounted firmly to the plate. When mounting patterns on cope and drag plates, however, be sure that cope frame and drag fit accurately, that the drag frame fits the drag plate, and that the cope frame fits the cope plate. In the case of cope and drag mounts with an elongated or slotted bushing on one end, the bushing must be removed and replaced with a round bushing during the pattern mounting procedure only. It later is replaced with the original bushing.

There are many variations of the plaster transfer method, and with a little fiddling around you might come up with something more suitable to your particular operation than the foregoing method. However, this is the basic procedure. Whether the patterns are pinned or screwed to the plate is a matter of individual preference.

In my opinion, it is poor practice to drill patterns prior to mounting on plates, tap out the drag half or cope half of the pattern, mount the patterns by drilling oversized holes through the matchplate and rely only upon the screw which passes through the cope half of the pattern and the plate and into the drag half of the pattern.

I have had experience with clamping patterns together and with the screw method. I also have drilled through the two halves of the patterns and mounted the patterns across from each other on a matchplate by driving a pin through the hole and an oversized hole in the plate and into the remaining half of the pattern. If by chance the drill does run off, however, the farther the patterns are separated, the greater the mismatch will be.

With the plaster transfer method, however, it doesn't make much difference which way the drill goes as long as the patterns are secured tightly to the plate prior to the removal of the plaster. The plaster will hold patterns accurately across from each other during the drilling, tapping or pinning operations. Any type of method for mounting can be used in conjunction with the plaster.

The accuracy of this system depends entirely upon how accurately and closely your transfer frames fit up.

I trust this will be of some help to you, Sam.

Sincerely,
CHARLIE

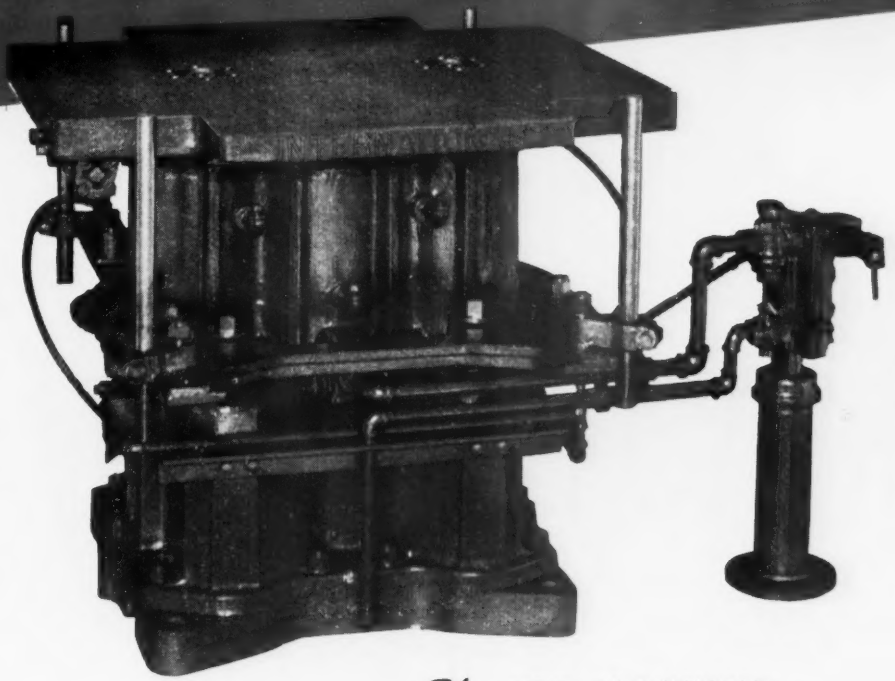
"Man alive, is it ever—yeeomie—hot today!"

INTERNATIONAL TYPE

JDP MACHINE

The JDP has the exclusive Double Jolt Feature. A **Positive** Jolt and a **True** Ram.

TWO JOLT SECTIONS combined in one integral unit.



The JDP is adaptable to a large range of work, suitable to the pin lift style. It is readily adjustable. The incorporation of the Double Jolt Feature, combined with the sturdiness of the machine, gives a positive ram throughout the mold.

The lifting section is guided by hardened steel parts for long lasting wear. All valves are conveniently located for ease of operation. Wearing parts can be readily replaced.

The **JDP MACHINE**

by

INTERNATIONAL

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"...just common sense to use Tru-Steel!"

Right! There are 3 basic reasons why it's common sense to use Tru-Steel:

1. *Tru-Steel lasts longer.* Scientifically heat-treated, drawn to precise tolerances, it will not break into fines that cause wear of machine parts.
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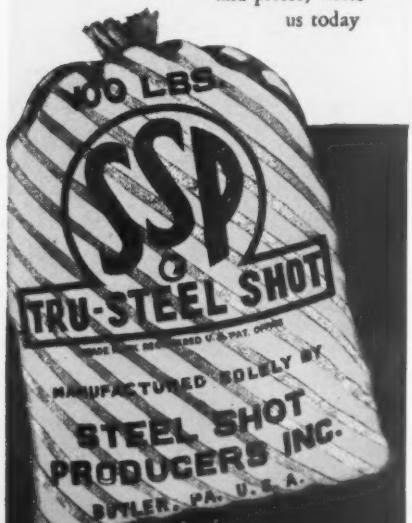
3. *Tru-Steel costs less.* Yes, in sizes most popular for blast cleaning, Tru-Steel costs less than any other steel shot of comparable analysis and heat treatment.

Simple, isn't it? For full information and prices, write us today



STEEL SHOT PRODUCERS, INC.
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Subsidiary of Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

One Way To Help Improve Relations with Employees

Plan Offers Guidance to Family at Difficult Time

By Earle M. Layman*

IN INDUSTRY, just as in every other phase of life, consideration must be given to the unpleasantness of death. Last year alone over 1 per cent of our employees passed away. The majority of them were long-time, faithful employees.

Our personnel department bears the responsibility for conveying to the family of the deceased the company's condolences and offers its services to whatever extent is desired. Realizing the lasting and far-reaching effects that our handling of such matters will have, we try to be completely thorough.

Because of this, plus the fact that in our organization our personnel office represents our insurance carriers in such matters as life insurance, hospitalization, medical, surgical and accident and health benefits, we devised a systematic but personal procedure for processing and covering all phases incidental to the matter. To eliminate the omission of the slightest detail, we prepared a mimeographed work sheet. When word is received of an employee's death, this sheet immediately is prepared in detail, and in later discussion with the beneficiary or the family it is used as a reference.

Immediately following preparation of this form our personnel director, or his representative, promptly calls upon the beneficiary. As can be expected, we find most of them to be in a deeply grieved state, as well as bewildered and confused. We offer our condolences and services and at that time secure the basic information necessary for processing the proof of death for the life insurance claim. Wherever possible we like to deliver the basic life insurance check promptly, even before burial, and usually within 24 hr of our original visit. We feel that this will help minimize any financial concern which may exist.

After the funeral, we visit the beneficiary again at a convenient time to discuss such items as life insurance, social security, income tax, accident and health benefits, hos-

*Mr. Layman is director of personnel, General Steel Castings Corp., Granite City, Ill. His description of one of that company's practices, as detailed in this article, earned the Research Institute of America's Award for Merit. Such awards are given "for effective contribution to the development of executive skills in human relations."

BIN STUCK LATELY?

Here I am lying in bed wondering how to loosen up the material in those troublesome bins. What am I going to do?

Get yourself some sleep, brother . . . a CLEVELAND AIR OR ELECTRIC VIBRATOR will stop arching, bridging or sticking in your bins *quickly* and *quietly!*

Literature on request.

THE CLEVELAND VIBRATOR COMPANY
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pitalization and dependent hospitalization coverage, and also develop the various status of these items. In addition, we also invite discussion of personal items in which we might be of assistance.

Shortly following this visit we write a letter to the beneficiary, devoting a paragraph to each of the items discussed above. The letter tells what has been done or what the beneficiary should do about each item. The instructions tell where to go, giving the address and enumerating what information will be required. We go to great lengths to work everything out in detail. On each visit and periodically throughout the discussion we encourage the beneficiary to contact us at any time with any problem she may have, assuring her that if we do not immediately have the answer we will secure it from the proper source.

The dividends realized by this procedure can be portrayed best by the splendid compliments received from the workers' families, their friends, and especially from the workers' fellow employees. The most common expression from fellow employees to us has been: "It is a wonderful feeling to know that at a time of tragedy some capable person will come to my family, one whom we have faith in and who will guide them through the troubled hours. I have told my wife all about this splendid service your department renders."

This small but thorough plan has been a tremendous influence to us in creating even better employee relations.

Precast Concrete Roof Decks Go on Many New Foundries

About 2½ million sq ft of precast concrete roof deck was installed on new foundries and forge shops during the ten years 1945 through 1954, according to a survey by the manufacturers of the roof decks. The survey showed that installations were made on 141 foundries and forge shops.

A total of 203 million sq ft of precast roof deck was installed in the same period at more than 8000 industrial, institutional, governmental and commercial locations. This total would roof over Manhattan Island from the Battery to Central Park or pave a 200-ft wide highway from New York to Washington, D. C. These figures cover only the installations by the nine manufacturers who produce over 80 per cent of such material.

New, improved Taylor Made

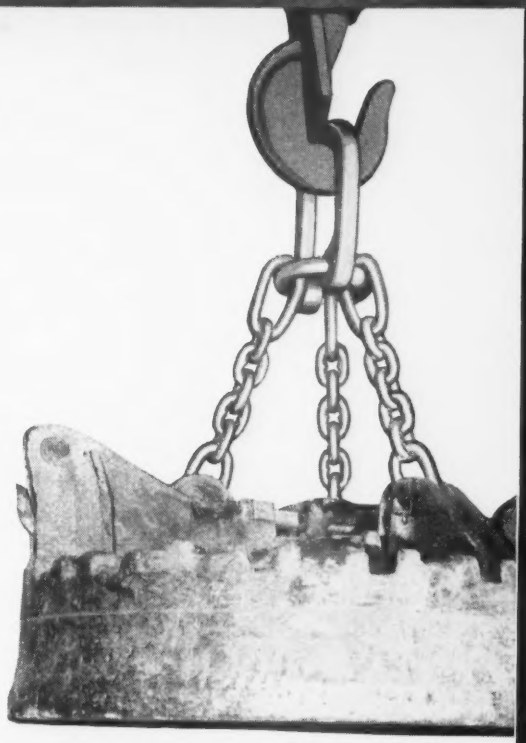
ALLOY STEEL

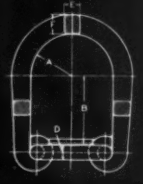
DOWNTOWN TYPE

MAGNET CHAIN

lasts 5 to 15 times longer

than conventional three-leg types!





New Lifting Bail Design provides larger opening for crane hook. Heavy, squared-type Alloy Steel construction assures longer life.

Locating Plate takes larger joiner links with squared top sections—keeps chain legs at 120° centers to reduce wear due to friction, twisting and gouging.

Patent No. 2626175

Designed to eliminate wear due to twisting—reduces the lifting angle and therefore increases the strength and life of chain. Made with Taylor Made Alloy Steel Chain, it has twice the strength of wrought iron assemblies. It's tougher too! Heat-treated—it has great resistance to shock lifts, grain-growth and work-hardness at low temperatures—never requires annealing. Lasts five to fifteen times longer!

S. G. Taylor Chain Co., General Offices and Plant, Hammond, Indiana; Eastern Sales Office and Plant, Pittsburgh, Pennsylvania.

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A GREAT NAME IN Chain SINCE 1873

S. G. Taylor Chain Co.
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Rush free copy of Folder No. 85A giving all the facts on Taylor Made Alloy Steel Downtown Magnet Chain.

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. . . to the foundryman

. . . is the sound of profitable production

The progressive foundryman . . . like the eminent musician . . . knows that skill alone is not enough. Both rely on top-quality precision "equipment" to achieve greater success in highly competitive fields.

SPO also recognizes this basic need . . . the need for precision machines. That is why SPO specializes in the development and manufacture of dependable molding machines . . . efficient machines that produce a greater volume of uniform standard molds . . . eliminate "human error" . . . cost less to operate and maintain.

SPO molding machines give you the "sweet music" of profit.

Write today . . . or call DIamond 1-3666 . . . for additional information.

WORLD'S LARGEST SUPPLIERS SPO OF MOLDING MACHINES

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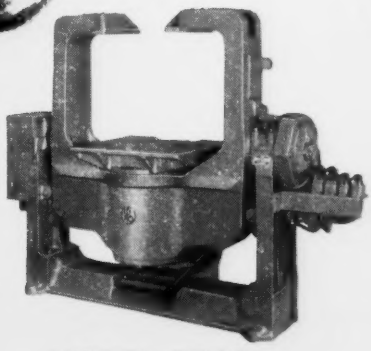

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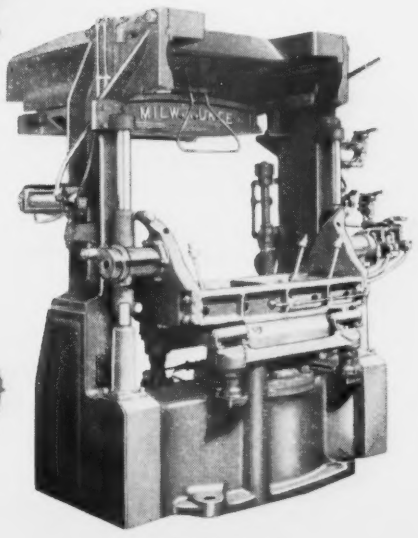

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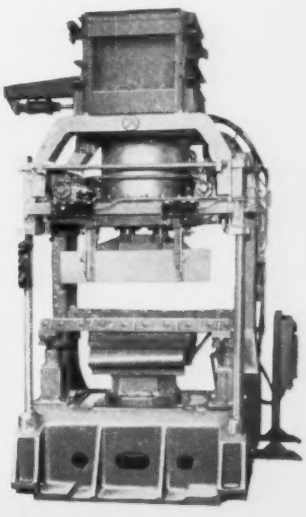


MODEL 2302

ACTIVITIES of Foundry Groups

Northeastern Ohio: One hundred and fifty members and guests of the AFS chapter kicked-off the 1955-56 season as they met at Tudor Arms Hotel, Cleveland, on Sept. 8 to hear Spencer Irwin, associate editor and foreign affairs columnist, *Cleveland Plain Dealer,* discuss "The State of the World and American Trade."

David Clark Jr., Forest City Foundries Co., immediate past chairman, introduced incoming chairman Lewis T. Crosby, Sterling Wheelbarrow Co., who presided at the meeting. James J. Schwalm, Federal Foundry Supply Co., membership chairman, reported on the status of chapter membership and pointed out that Chicago had regained its position over Northeastern Ohio as the world's largest AFS chapter by a count of 735 to 716.

Norman J. Stickney, Sand Products Co., reported on advance arrangements for the Ohio Regional Foundry Conference to be held at Case Institute of Technology, Cleveland, on Oct. 20-21. "Better Castings for Better Living" is the theme of the conference and 21 speakers will speak. The conference is sponsored by the Northeastern Ohio, Central Ohio, Canton, Cincinnati and Toledo chapters of the AFS in co-operation with Case Institute.

O. Jay Myers, technical director, Archer-Daniels-Midland Co.'s Foundry Products Division, Minneapolis, and a national director of AFS, was a guest at the meeting.

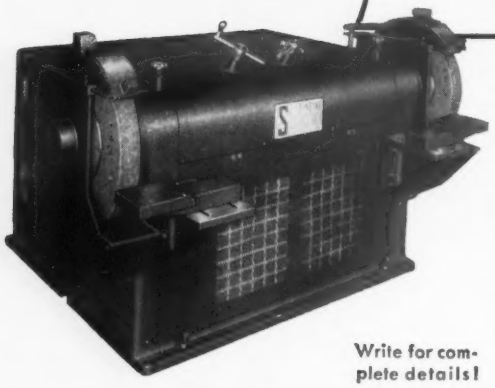
Alexander D. Barczak, Superior Foundry Inc., vice chairman, introduced Mr. Irwin. Mr. Irwin presented an interesting interpretation of current political and economic trends and conditions in Europe, the Far East and South America with emphasis upon the roles being played by the United States, Russia, Great Britain, West Germany, France and Italy. New relationships between East and West, West Germany's trade build-up and impending rearmament, internal conditions in France and Italy, effects of the Marshall Plan, England's precarious position because of "too much prosperity," Argentina's recent revolts against Peron and other events of international significance were dwelt upon at length by the speaker with interpretations of some of the fears, suspicions and actions that seemingly are always present to maintain world tensions.—*Kenneth L. Mountain.*

Northwestern Pennsylvania: Newly elected officers and directors of the AFS chapter met Aug. 4 at the Antlers Hotel, Erie, Pa., to hold an organizational meeting and appoint committees for the 1955-56 season. Officers for the coming year are Jacob Dimert, Erie Castings Co., chairman; Robert Johnson, Bucyrus Erie Corp., vice chairman; E. J.

ACTUAL COST FIGURES!

WITH OLD STYLE GRINDERS
WHEEL COST PER TON
$3.36
WHEEL COST
PER 100 UNITS
$2.23

WITH STANDARD
INFINITELY VARIABLE SPEED
SNAGGING GRINDERS
WHEEL COST PER TON
$2.34!
WHEEL COST PER
100 UNITS
$1.21!



We will be pleased to forward the report containing these actual cost results from a midwestern steel foundry after installing STANDARD infinitely variable speed Snagging Grinders.

The report is typical of many others in our files representing all types of foundries . . . reports that make Standard Grinders outstanding in effecting HIGHER PRODUCTION with LOWER COSTS.

Write for complete details!

Single and twin motor, to 100 hp, 18" to 30" wheels.

FOUNDRY GRINDER DIVISION
Since 1912
the STANDARD electrical tool co.
SNAGGING GRINDERS AND MACHINE TOOLS
2507 RIVER ROAD • CINCINNATI 4, • OHIO

Dear Reader:

Just a "quick note" to tell you about some good reading our editors have planned for you in the months ahead--

Plaster Molding: a report on this always-interesting process is "in the works". Will show and describe the "Antioch Process" at Morris Bean & Co. foundry, Yellow Springs, Ohio.

How to Improve Soundness of Bronze Castings through vacuum treatment of melts and wedge chilling of castings -- another significant report by Naval Research Laboratory.

The Role of Oxidation in Correct Baking of Cores --- Use and Function of Chills in Sand Molds --- Effect, Detection and Removal of Impurities in Copper-base Alloys: COMING SOON!

Melting Furnaces in the Brass Foundry is Harry St. John's special discussion for brass foundrymen in this issue. See Contents Page for exact location.

Lynchburg Foundry's New Shell Mold Foundry is the special feature in this issue. It should be good reading for many.

Our LATE NEWS INSERT appears, as always, on page 33 of this issue.

It's our job and we like it: KEEPING FOUNDRYMEN POSTED!

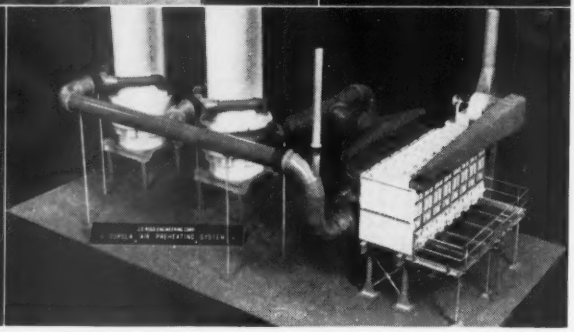
FOUNDRY

The Industry's Leading Foundries
Are Users Of The Dependable

ROSS OVENS and HEATERS

CORE BAKING

CUPOLA HEATING



To Have ROSS Designed Equipment Is To Have The Most Modern Equipment

The new ROSS Horizontal Core Ovens are complete with heating and cooling equipment and operate with multiple baking passes. They feature specially designed nozzles that insure even distribution of treated air. Fully automatic control of time, cycle, speed and temperature is assured.

The popular ROSS Hot Blast Cupola Heating System not only greatly increases tonnage but insures sizable savings in coke, labor and maintenance costs. It operates with your present blowers and can be installed with no interference with your melting schedule.

Write For Copy of Our Bulletin No. 52.

J. O. ROSS ENGINEERING CORPORATION

Main Office: **444 MADISON AVE., NEW YORK 22, N. Y.**

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ROSS ENGINEERING OF CANADA, LIMITED, MONTREAL, CANADA
CARRIER-ROSS ENGINEERING COMPANY, LIMITED, LONDON, ENGLAND

Bonesteel, General Electric Co., secretary and Richard Strong, Griswold Mfg., treasurer.

Following members were appointed chairmen of committees: Educational, P. W. Green; Publicity, W. Yahn; Membership, O. Bueg; Advisory, B. Herrington; Entertainment, J. Condidine; Program, R. Johnson; Financial, R. Strong and Reception and Tickets, R. Erskine. A tentative speakers program was presented to the group and will be announced when completed.—*E. J. Bonesteel, General Electric Co.*

Ontario: Perfect weather and a large turnout of members and guests combined on Aug. 27 to make the AFS chapter's annual field day a success. Golf tournament was held at the Credit Valley Golf and Country Club. In the afternoon, members enjoyed the surroundings at Hawkhill Farm, near Milton, the country estate of W. Rolph Barnes. Horseshoe pitching, darts, feats of strength, swimming and other contests, kept everyone amused. A corn husking contest, buffet supper and awarding of prizes concluded the day of relaxation and entertainment.—*Leonard Humphreys, A. H. Tallman Bronze Co. Ltd.*

Southern California: Some 450 foundrymen attended the 18th annual picnic of the AFS chapter at Lakewood Country Club, Long Beach, Calif., on Aug. 13. About 80 chapter members participated in the golf tournament with Richard Ludwick, Sound Cast Corp., receiving a trophy for his score of 76. Pat Valentine's trio provided song and music for afternoon entertainment. A fast-moving stage show was presented in the evening.—*Edwin J. Worth, Howell Foundry Co.*

St. Louis: Over 250 members and guests of the AFS chapter attended the annual picnic at Lemay Grove, St. Louis County on Aug. 6. Entertainment chairman, Jack H. Thompson, East St. Louis Castings Co., directed the affair. Foundrymen defeated the suppliers in the ballgame, 16 to 15. John Slaigh, Bee Line Trucking Co., supervised serving of the barbeque. Local suppliers donated attendance prizes. *Jack Bodine, Bodine Pattern & Foundry Co.*

Philadelphia: Manufacturer's Golf and Country Club, Philadelphia, played host to more than 550 members and guests of the AFS chap-

Nothing Like Famous CORNELL CUPOLA FLUX for giving you Cleaner Iron

No, there's *nothing* equal to Famous Cornell Cupola Flux for increasing slag flow off and purifying molten iron. Here's why!

Famous Cornell Flux purifies metal by chemically reacting with the molten mass to increase fluidity of iron and slag. There is less digging out and downtime. Castings are free from hollow centers and hard spots. Machining is easier. In addition, Famous Cornell Flux gives a protective glaze to cupola linings to protect them from the ravages of the molten metal. Why not call a Cornell Engineer to help you with your iron making problems? Or write for Bulletin 46-B.

Have you tried Famous Cornell Aluminum Flux?

Have you tried Famous Cornell Brass Flux?

Write for Bulletin 46-A

The CLEVELAND FLUX Company

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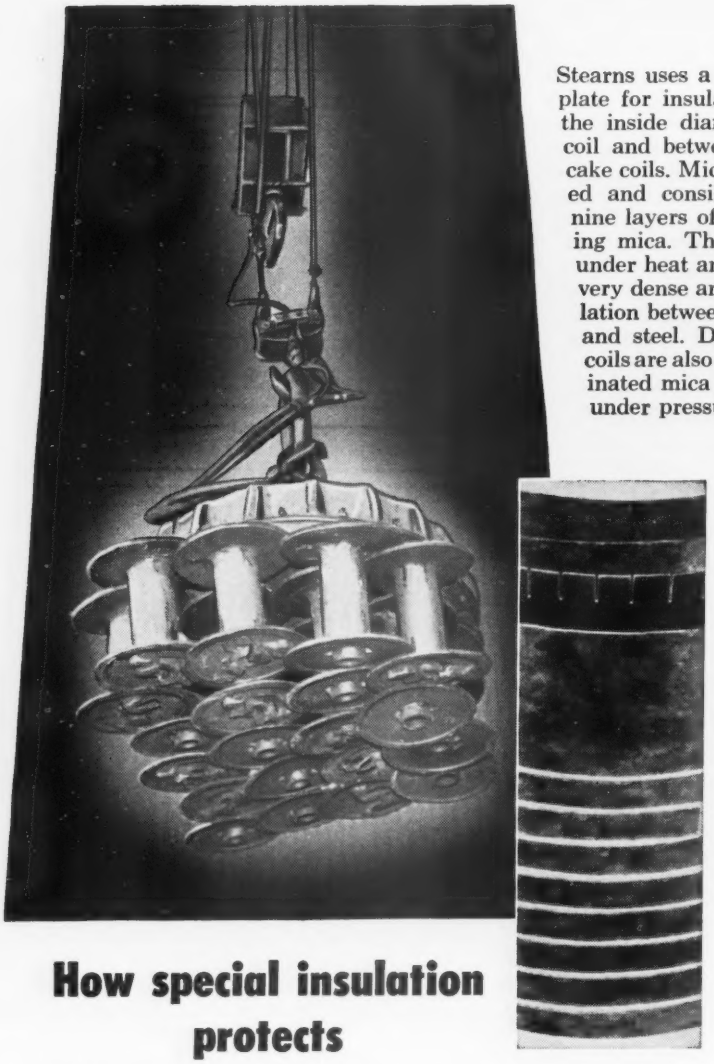
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered



Stearns uses a special mica plate for insulation around the inside diameter of the coil and between the pancake coils. Mica is laminated and consists of about nine layers of 1/32-in. molding mica. This is applied under heat and provides a very dense and hard insulation between the copper and steel. Discs between coils are also made of laminated mica and finished under pressure.

How special insulation protects

DEEP-DOWN PULLING POWER

Protect the coil and you safeguard the very heart of a lifting magnet. That is why powerful, deep-field Stearns magnets are built with extra heavy-duty coil insulation, extra protection against shorts, burn-outs, current leakage.

With this insulation, a Stearns lifting magnet can withstand heat generated during steady work periods—operates profitably on long-shift duty. And it's added protection when magnet is working outdoors or under excessively damp conditions.

Superior insulation is only one of the ways Stearns keeps its powerful lifting magnets in top operating condition. See your Stearns representative for all the facts, or write for Bulletin 35-C.

1140

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC., 662 S. 28th St., Milwaukee 46, Wis.

ter at its annual outing on July 22. It was the hottest day of the year with the mercury at 102 but golf, softball, quoits and swimming provided entertainment for all. The final outcome of the annual softball game between the "Peddlers" and "Foundrymen" was never determined. All that played received a prize. Following dinner, prizes were distributed prior to a floor show.—*Charles R. Sweeny, Atlantic Steel Castings Co.*

Cast Plaque Is Awarded to Old Timers of Wisconsin

Since 1940 the Wisconsin Chapter of the American Foundrymen's Society each year has been honoring the veteran foundrymen of its area. The annual Old Timers' Night is the occasion for an attractive plaque, as shown here, to be presented to newly

qualified members in the Old Timers' Club. Membership means that an individual has had 50 years or more of active association with the foundry industry.

The metal plaque, cast of bronze by the Standard Brass Works, Milwaukee, measures 7½ x 9½ in. and is ⅞-in. thick, and is mounted on wood.

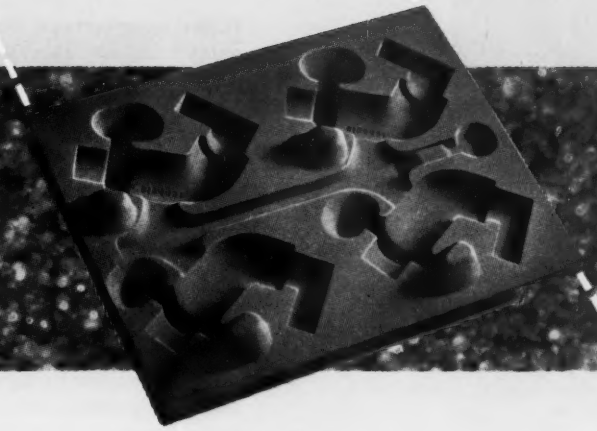
The Old Timers' Club, of which Charles Zahn, Vilter Mfg. Co., Milwaukee, is chairman, had 126 living members at the time of this year's plaque presentations. An average of 16 new members have been added annually in recent years.

Equips Nonferrous Foundry

American Alloys Corp., 5245 Fairlawn Ave., Baltimore, has equipped 5000 sq ft for nonferrous foundry work. It will engage in general commercial business.

ROVED AVINGS

ACME RESIN



20-POWER MAGNIFICATION OF RESIN-COATED GRAINS OF SAND.

PlastiSand PROCESS

Resin formulation and the coating process covered by Patents Pending

PLASTISAND IS A REVOLUTIONARY PROCESS UTILIZING LIQUID-RESIN COATED SAND IN FOUNDRY SHELL MOLDING

Here is a totally new development by Acme Resin Corporation in a relatively new field of shell-molding. Because of its several positive advantages it overcomes the primary deterrents to the use of the more widespread "C" or shell-molding process.

Foundries using the PLASTISAND Process report PROVED SAVINGS in batch after batch of identical, superior molds with *as little as one-half* the resin content formerly necessary with dry resin.

When the PLASTISAND Process is used—DUST IS ELIMINATED, another PROVED SAVINGS over the use of dry-resin and the resulting harmful dust. Elimination of dust saves both people and equipment from the many hazards it causes.

Another PROVED SAVINGS feature with the PLASTISAND Process is the shorter dwell and faster cure—from a shorter time on the pattern and a faster baking cycle.

Acme's new process is adaptable to dump box, roll-over and blowing of either shells or cores. It uses either hot or cold mulling—in both, ACME liquid resin is used.

PLASTISAND ADDS UP TO PROVED SAVINGS!

Here is a quick check list of some of the other features of the PLASTISAND Process:

SUPERIOR TENSILE STRENGTH—PLASTISAND molds have much greater cold strength, a factor gaining importance as new stack pouring techniques are developed.

NON-SEGREGATING—Each grain of sand is completely and uniformly coated with liquid phenolic resin in the PLASTISAND Process—segregation cannot occur.

EXCELLENT HOT STRENGTH—The hot strength of PLASTISAND molds is equal or superior to that obtained by the use of dry-resin sand mixes.

GREATER PRODUCT UNIFORMITY—Because it is non-segregating, resin-coated sand prepared by the PLASTISAND Process yields almost identical molds, batch after batch.

An informative folder has been prepared to better acquaint the foundry industry with the new PLASTISAND Process. It may be obtained by writing to the ACME RESIN CORPORATION at the address listed below right.

ACME RESIN CORPORATION

1401 CIRCLE AVENUE • FOREST PARK, ILLINOIS

New Equipment and Supplies

Sand Preparation: Beardsley & Piper, Division Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.—Above-floor sand preparation machine has a loading height of 50 in. so it can be used with any front end loader. Hopper capacity of 65 cu ft can be increased where headroom is available. Top capacity is 78 tons per hour of fully mulled and conditioned sand. Separate dustproof motors are provided for the belt drive and the screen drive. High-capacity electromagnetic separator provides scrap removal.

For More Details Circle No. 1—Page 247

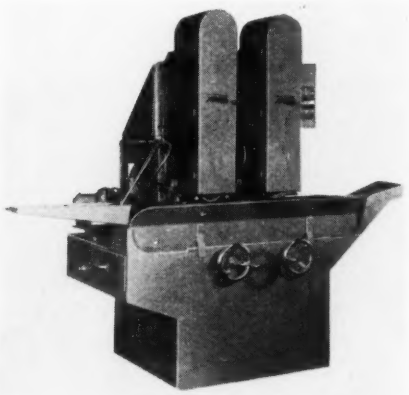
Cold Set Core Binder: Thiem Products Inc., 9800 West Rogers, Milwaukee 14, Wis.—Chemically treated drying oil is the only binder added to dry, room-temperature sand in preparing a core mixture said to have excellent flowability. Manufacturer reports that elimination of water, clays or cereal binder produces cores with low green strength and minimum gas evolution. Permeability is increased thus helping to remove gas produced during pouring operations through open sand void structure. Clay-free sands are bonded with the oil, known as Synol C-2 at ratio of 1½ to 2 per cent by weight of the sand mix. Mulling time is 10 minutes in conventional mullers, normal mixing cycles in speed mullers. Completed core remains in corebox where cold curing develops green strengths of about 12 to 15 lb in about one hour. Cores are baked at 375-400° F in a short time.

For More Details Circle No. 2—Page 247

Dust Collector: Schmieg Industries Inc., 23930 Sherwood, Center Line, Mich.—Portable, packaged dust collecting system is for use in small installations or in isolated machines in large plants. It is available with casters where flexibility is needed for special operations. Unit extracts dust and other particles by a combination centrifugal separation and filtration. It has a replaceable standard "throw-away" filter. Heavy particles are separated from the air and deposited in a drawer at the base of the unit for disposal.

For More Details Circle No. 3—Page 247

Belt Grinder: Engelberg Huller Co., 831 West Fayette St., Syracuse 4, N. Y.—Semiautomatic multiple head conveyor type abrasive belt grinder is designed for wet or dry grinding and polishing of ferrous, nonferrous, plastic and other materials. It is said to be especially suitable for grinding and deburring flat surfaces on a high production basis. Conveyor belt can be adjusted manually for settings from 5 to 30 fpm. Machine will not start unless belt is tensioned. Machine is 90 in. long x 51 in. wide x 90 in. high with a belt 6 in. x 80 in. Abrasive belt speed is 5500 sfpm. Maximum piece capacity of 4 in. high x 6 in. wide, any length. Single, double or any number of heads and 5 or 7½-hp drive can be supplied. Magnetic chuck is optional.



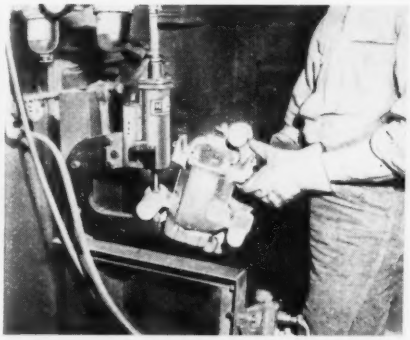
For More Details Circle No. 4—Page 247

Ladle Lining: J. H. France Refractories Co., Snow Shoe, Pa.—Graphitic plastic ladle lining is recommended for use in gray iron, nonferrous, malleable iron and steel foundries. Manufacturer specifically recommends it for use in malleable iron runners and spouts, tap holes, wells, slag holes, cupolas and cupola slagging spouts, and pouring and hand ladles. Product is packaged in 100 lb carton or 100, 200 and 500 lb air tight steel drums.

For More Details Circle No. 5—Page 247

Shakeout Tool: Keller Tool Division, Gardner-Denver Co., Grand Haven, Mich.—Shakeout tool for removal of sand from small castings

For More Details on These Items
Use Reply Card—Page 247



is designed for pattern and model shop foundries, brass foundries and small job lot foundries which do not require large shakeout machines. Tool has an air-operated reciprocating peen mounted to a C-section yoke. Casting is placed in the yoke and the tool is set in operation with a hand or foot valve. Peening tool advances until it contacts the casting. A peening stroke takes place which dislodges all green and dry sand from the casting.

For More Details Circle No. 6—Page 247

Abrasive Cloth: Amerotron Corp., 1407 Broadway, New York, N. Y.—Transparent mesh abrasive cloths have many uses including pattern finishing, core and filler sanding in foundries and metallic finishing. Special rayon cloth is covered on both sides and through its mesh openings by abrasive particles of aluminum oxide or silicon carbide bonded by a waterproof resin. Manufacturer reports that in comparison with conventional abrasive materials the cloth has yielded cost reductions, labor savings, smooth finishes and a minimum of rejects in wide industrial applications.

For More Details Circle No. 7—Page 247

Wire-Rope Hoists: Hoist Division, Harnischfeger Corp., Milwaukee 46, Wis.—Wire-rope electric hoists of 250, 500, 1000 and 2000 lb capacities feature two brakes—a motor brake and a load brake—either of which will hold the full load. A 10 ft lift is standard with 14, 18 and 20 ft lifts as optional equipment. Units can be obtained for use on all common lighting and power circuit voltages.

For More Details Circle No. 8—Page 247

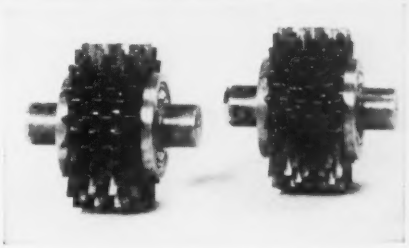
Floor Repairs: Maintenance Inc., Wooster, O.—Ready-mixed granulated compound of hard, accurately-sized aggregates and processed asphalts is said to form a tough, resilient floor surface suited for foundries, steel mills and other industrial applications. It is supplied in 5 gal pails and 30 and 55 gal drums.

For More Details Circle No. 9—Page 247

Electrical Cord: United States Rubber Co., Rockefeller Center, New York 20, N. Y.—Electrical cord is made for use with grinders, drills, power saws, buffers and other types of heavy duty portable electrical tools. Cord is oil, heat, flex and tear resistant and has a service life three times longer than present high-quality cords, according to the manufacturer.

For More Details Circle No. 10—Page 247

Wheel Dresser: Aer-O-Matic Tool Co., 5059 West Diversey Ave., Chicago 39, Ill.—Precision ball bearing mechanical wheel dresser is for roughing operations in disc, spring and snag grinding. Cutters are staggered on a slotted sleeve and roll as one unit on bearings with one

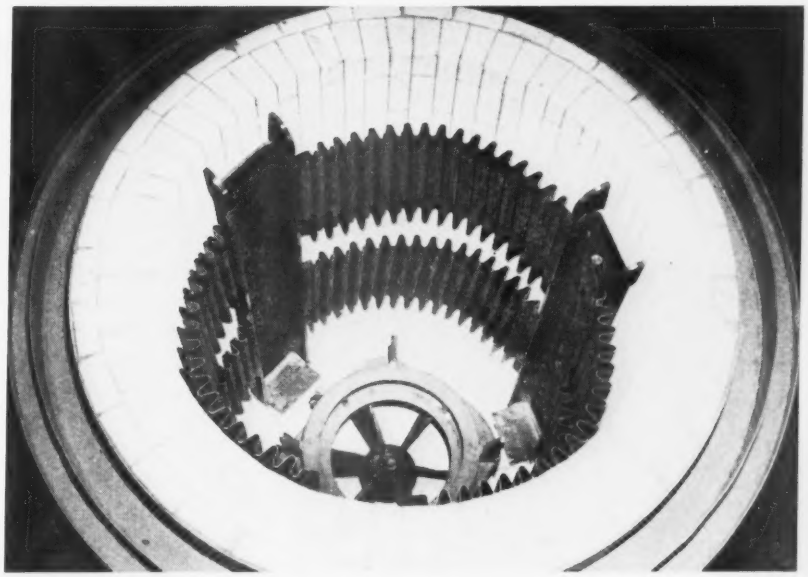


spindle shaft to avoid "chewing up" keyways or square arbors before cutters are worn out. Eleven-gage cutter discs have a $2\frac{3}{8}$ in. outer diameter with $\frac{7}{16}$ in. teeth. Units can be adapted to other holders. Other types of spindle units are available along with holders for all make grinders.

For More Details Circle No. 11—Page 247

Band Saw Blades: W. C. Barnes Co., 1297 Terminal Ave., Detroit 14, Mich.—Band saw blades feature teeth that incorporate a positive rake angle and a smooth blending of radii

Electric Furnace Elements Use Low Voltage



ELECTRIC heating elements for heat treating furnaces consist of corrugated sheets of nickel chromium designed to hang from hooks and nearly cover the walls of the furnace. Sheets are hung from alloy hooks extending through the roof. No supports or hangers need be built into the walls. Corrugations are said to give strength, greater length for greater resistance and can be spaced to vary the heat release along the length of the element to compensate for door heat losses or incoming cold work. The large elements are necessary to accommodate amperages 10 to 20 times greater than in previous types of elements. Voltages used range from 6 to 10. The corrugated heating elements are produced by Lindberg Engineering Co., 2450 West Hubbard St., Chicago 17, Ill.

For More Details Circle No. 12—Page 247

It Pays To Take a

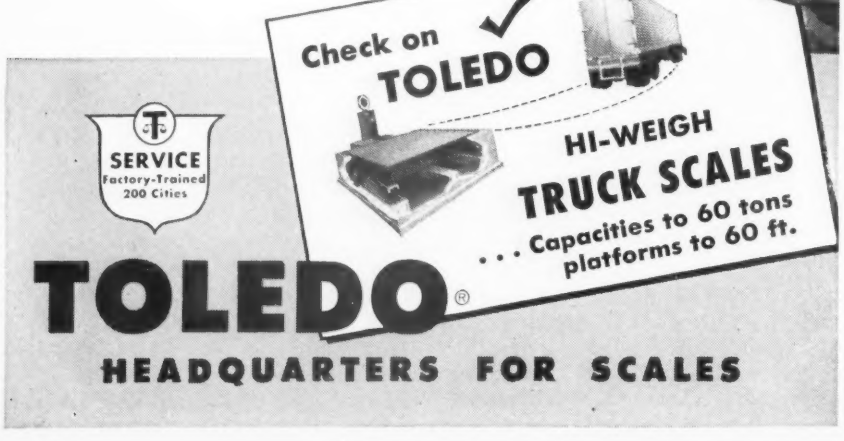
Plant-Wide Look

at Weighing!

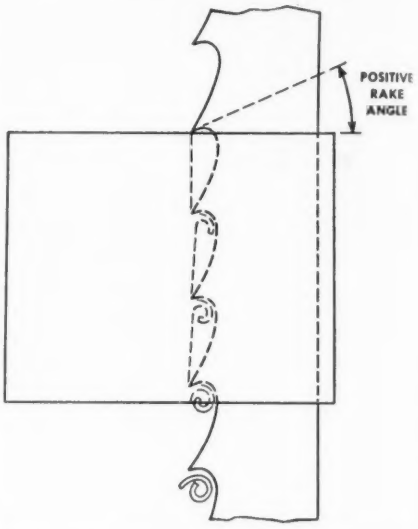
A Modern Weighing System Makes the Big Cost-Control Difference

Today it's more than ever important to think of weighing not in terms of isolated scales, but as a vital part of your overall quality-control and cost-control system. This means the right scales in the right places . . . to provide basic accounting records of materials received, processed, shipped or transferred. Weight records that originate at scales directly affect costs, inventories and customer billings. Weighing errors cannot be corrected later—weights must be right the *first* time. That's why it's so important to have a modern weighing *system* for top efficiency in your plant operations.

May we tell you more about the "weighing system plan"—and its application to your requirements? Write to . . . Toledo Scale Company, Toledo 1, Ohio.



in the tooth gullet to permit greater chip removal without increasing frictional heat, according to the manufacturer. Other advantages claimed are faster, easier cutting and longer blade life. Positive rake angle inclines the teeth toward the work to give more bite with lower



feed pressure. Blades are supplied in standard sizes, 2 to 6 teeth per in., ¼ to 1 in. in width, packaged in 100, 250 to 500 ft coils or cut to length and welded.

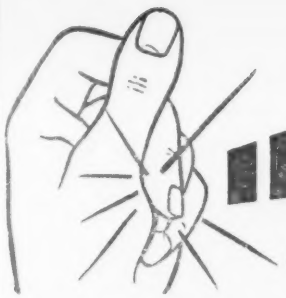
For More Details Circle No. 13—Page 247

Horizontal Grinders: Buckeye Tools Corp., Division 20, P. O. Box 966, Dayton 1, O.—Horizontal grinders for all classes of grinding work

feature built-in mufflers which reduce exhaust noise, yet have no external parts to increase tool body diameter. Capacities range from 2½ x ½ in. organic wheel to 4 x ½ in. vitreous wheel on a ⅜ in.-24 spindle model and from 2½ x 1 in. to 6 x ½ in. on the ½ in.-13 spindle model. Either type can be adapted to use with wire brushes or roll abrasives.

For More Details Circle No. 14—Page 247

Air Compressor: Bell & Gossett Co., Morton Grove, Ill.—High capacity, piston type air compressors for continuous operation while delivering up to 175 psi are said to deliver oil-free air. Specially constructed graphite or carbon piston rings are used instead of conventional steel rings and require no oil



IDEAS FOR FOUNDRYMEN

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Arc Furnace Transformers

General Electric Co., Schenectady 5, N. Y.—Bulletin GEA-6236 features a guide form to assist arc furnace users in preparing specifications for the transformers which will best serve their needs. Construction and operation of a wedge type tap changer is described. Weights, dimensions and cooling water requirements for transformers in ratings from 750 to 15,000 kva, with approximate low-voltage values, reduced capacity and total reactance also are included.

82. Epoxy Resins

Kish Industries Inc., 1301 Turner St., Lansing 6, Mich.—Brochure points out savings in time and expense said to result from use of epoxy resins that may be cast over any type of material such as plastic, iron, steel, Kirksite, glass or wood to provide a tool or model that will remain dimensionally stable and can be machined when necessary to adapt engineering changes.

83. Firebrick

Refractories Division, Babcock & Wilcox Co., 161 East 42nd St., New York 17, N. Y.—Properties, characteristics and typical applications of firebrick for use in industrial furnaces are discussed and graphically illustrated in bulletin R-34. Tables for estimating brick quantities for arches and circular linings are included.

84. Chain Blocks

Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Division, Muskegon, Mich.—Construction features, specifications, dimensions, catalog numbers, operating characteristics and prices of aluminum chain blocks in 3 to 10 tons capacity are included in bulletin 415.

85. Holding Magnets

Stearns Magnetic Inc., 662 South 28th St., Milwaukee 46, Wis.—Bulletin 138-C illustrates and points out features of grinder holding magnets that are said to reduce grinding costs by reducing setup time and grinding time.

86. Materials Handling

Modern Equipment Co., Port Washington, Wis.—Bulletin 150 illustrates and describes line of overhead carrier systems that include overrail and underhung antifriction bearing hand power cranes, floor-operated electric crane and hoist units, I-beam trolleys, overhead switches and turntables, jib cranes, and monorail and crane runways.

87. Abrasive Shot

Wheelabrator Corp., 505 South Byrkit St., Mishawaka, Ind.—Catalog 89-B highlights the advantages said to accrue from use of steel abrasive shot made from electric furnace steel, fully heat-treated to a tempered martensite microstructure with an average hardness of 42 to 50 Rockwell C.

88. Bonding Clay

Eastern Clay Products Dept., International Mineral & Chemical Corp., 20 North Wacker Dr., Chicago 6, Ill.—General information and comparative performance tests with other clays are reported in bulletin. Advantages of the bonded clay as compared with bentonite also are discussed.

89. Sand Testing Equipment

Claud S. Gordon Co., 3000 South Wallace St., Chicago 16, Ill.—Revised bulletin 3600-55 presents complete line of sand testing equipment with illustrations, ordering information, and details of construction and application.

90. Nonferrous Grinding

Minnesota Mining & Mfg. Co., St. Paul 6, Minn.—Application photographs illustrate a variety of uses for grinding and finishing nonferrous metals with abrasive belts, grinding

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wheels, abrasive discs and cones. Pattern and machine shop applications also are included in bulletin.

91. Sand Recovery System

National Engineering Co., 549 West Washington Blvd., Chicago 6, Ill.—Operating information and outstanding features of sand recovery system are found in bulletin 512. A schematic drawing shows a typically arranged sand preparation system and points out the equipment necessary for the planning of, or conversion to, a system using the company's equipment.

92. Metal Desulphurizing

Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.—Booklet, "The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash," summarizes the advantages of treating molten metal with dense soda ash, gives details of these advantages and presents methods of application.

93. Shot and Grit

Abrasive Shot & Grit Co., Springville, N. Y.—Catalog AB-53 includes data on 14 standard sizes of shot and 12 standard sizes of grit manufactured to meet cleaning and peening needs. Special sizes can be made to order to fit specific requirements.

94. Moly Iron Castings

Climax Molybdenum Corp., 500 Fifth Ave., New York 36, N. Y.—Leaflet No. 1 shows application photographs and describes various iron castings with an explanation why molybdenum has been found the right alloying element on the basis of performance and cost.

95. Electric Arc Furnaces

Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh 30, Pa.—Application photographs, schematic drawings, dimensions, capacities and feature information on electric arc furnaces are included in 36-page catalog.

96. Vacuum Melting

Utica Drop Forge & Tool Corp., Utica 4, N. Y.—Booklet on vacuum melting process offers aid in solving critical metallurgical problems. Company has been in volume production of vacuum melted alloys for several months.

97. Cranes

Northern Engineering Works, Chene and Atwater Sts., Detroit 7, Mich.—Bulletins G-700 and SE-108 contain in-use application photographs of overhead electric traveling cranes for heavy materials handling.

98. Pattern Paint

M. A. Bell Co., 217 Lombard St., St. Louis, Mo.—Brochure points out inherent qualities in an aluminum pattern paint, aluminum plastic and a clear corebox paint. Pattern paint is said to make wood patterns impervious to moisture and most solvents.

99. Industrial Ovens

Michigan Oven Co., 415 Brainard, Detroit 1, Mich.—"Handbook of Oven Facts" acquaints the reader with the important considerations in the selection of process heating equipment and is intended to serve as a guide in determining oven types, construction, fuels, work handling methods and operating costs.

100. Refractories

Chas. Taylor Sons Co., P. O. Box 58, Annex Station, Cincinnati 14, O.—Bulletin 317 discusses properties and applications of corundum-base refractory that is recommended for furnaces where the refractory is subjected to abrasion and iron oxide attack at high temperatures.

101. Magnet

Dings Magnetic Separator Co., 4740 West Electric Ave., Milwaukee 46, Wis.—Catalog C-5000-B contains general information relating to various applications of magnetic separation as an industrial tool to protect machinery, reclaim iron, separate scrap or speed materials handling.

102. Electric Vibrators

Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland 13, O.—Catalog 11 describes line of electric vibrators, gives specifications and prices and furnishes illustrations of vibrators in action as well as information on mounting and installation.

103. Deoxidizing Agent

Carborundum Co., Niagara Falls, N. Y.—Booklet No. 5, "Producing Superior Gray Iron Castings with Ferrocarbo Briquettes," describes the use of a briquet with a claimed unique disintegrating agent for cupola deoxidation.

104. Pan Type Conveyors

Simplicity Engineering Co., Durand, Mich.—Bulletin 3255 describes series of conventional and balanced pan type conveyors that can be equipped with grizzly decks, side extensions, double carrying surfaces, screen cloth or perforated plate.

105. Casting Impregnation

Polyplastex International Inc., 441 Madison Ave., New York 22, N. Y.—Brochure details method for impregnation of structurally sound castings that is said to make possible 100 per cent "filling" of microporous voids.

106. Induction Furnaces

Ajax Electrothermic Corp., Trenton 5, N. J.—Bulletin 27-B offers photographs and general information on various induction furnaces for melting, forging and heating.

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for lubricating cylinder walls. Motor and compressor are direct-coupled and each cylinder is equipped with a safety overload valve. Compressors are rated at 35, 75 and 175 lb and from ¼ to ¾-hp.

For More Details Circle No. 15—Page 247

Motors: Century Electric Co., 1806 Pine St., St. Louis, Mo.—Line of totally enclosed fan-cooled motors are rated at 7½ to 100 hp. Motors meet all NEMA requirements and are recommended by manufacturer for use in dirty, dusty, fume and mist-laden atmospheres.

For More Details Circle No. 16—Page 247

Car Switcher: HemcO Mfg. Inc., Argonia, Kans.—Roadable-type rail car switcher for switching and spotting freight cars utilizes the box

car's weight, through weight transfer, to obtain traction and develops a draw bar pull of 7400 lb, which under average conditions is sufficient to propel three fully loaded cars. Unit has a coupler that provides positive connection with the rail car, and allows coupling from either side.

For More Details Circle No. 17—Page 247

Electric Vibrator: Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland, O.—Quiet, portable electric vibrators are designed to speed unloading of covered hopper railroad cars. Vibrator employs the rotary weight shaft principle of developing vibration but is self-contained with no pulleys or belting. Totally enclosed housing seals out moisture and dust. Units with voltages from 110 to 550 can be supplied. Working frequency of the vibrator is 3600 impulses per minute, corresponding to 60 cycles per second.

For More Details Circle No. 18—Page 247

Dust Collector: Torit Mfg. Co., 287 Walnut St., St. Paul 2, Minn.—Company's cabinet and cyclone type dust collectors are available with casters as optional equipment. Casters are hard rubber, 3 in. in diameter and 1 in. wide. Two casters in each set are provided with locks and all

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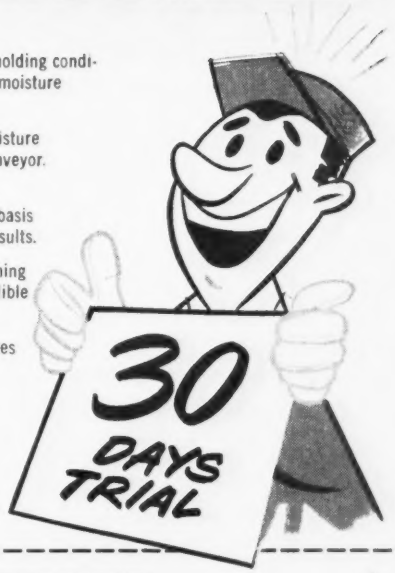

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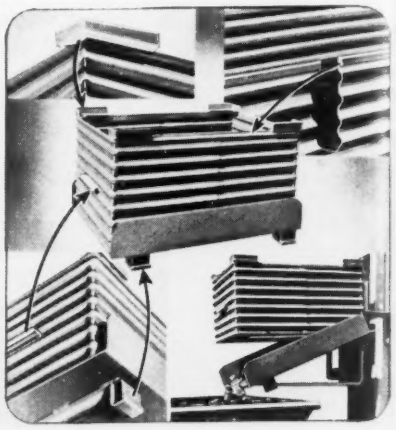
are welded to bottom of each unit. Seventeen collectors can be supplied with casters, ranging from a 160 lb model to a 1130 lb model.

For More Details Circle No. 19—Page 247

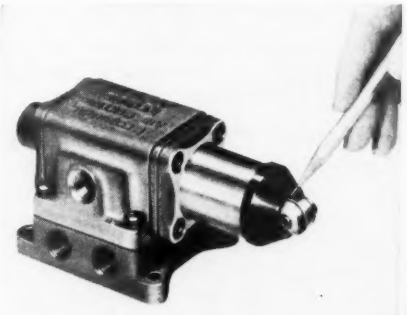
Drop Bottom Box: Palmer-Shile Co., 16033 Fullerton, Detroit 27, Mich.—Corrugated all-steel welded



drop bottom boxes are made for use either with positioning stand or for controlled dumping by fork truck. Safety corners prevent box shifting during stacking or when two or more are transported up or down grade. Boxes have four-way entrances and are built of any gage steel to customer dimension and capacity specifications.

For More Details Circle No. 20—Page 247

Cam Valve: Mechanical Air Controls Inc., 10030 Capital, Oak Park, Detroit 37, Mich.—Cam valve with large cam roller and cam plunger is



designed especially for foundries or other applications where sand, dirt or dust are present. Plunger spring is loaded to take care of overtravel on stroke and all working parts are completely sealed by means of a synthetic boot and otherwise sealed against external contaminants. Two models are available, one, a 3/8 in. 4-way, the other, a 3/8 in. 3-way.

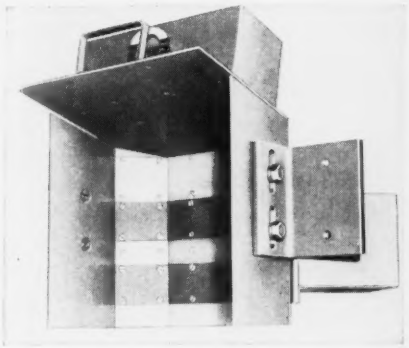
For More Details Circle No. 21—Page 247

Gage Blocks: Webber Gage Co., 12912 Triskett Rd., Cleveland 11, O —Thin gage blocks range in thickness from 0.090 to 0.010 in., with accuracies of ±0.000004 and ±0.000008

in. They are made of steel and are designed to withstand daily production use, the manufacturer says. Blocks are available either individually or in sets of 30 each.

For More Details Circle No. 22—Page 247

Permanent Magnet: Eriez Mfg. Co., Erie 6, Pa.—Permanent, nonelectric magnet is designed for use at the discharge end of belt conveyors on various sandslingers. It is said to perform two functions: Protect workers from fast-flying pieces of iron and purify molding sand of ferrous contamination. Two separate magnetic assemblies are incorporated in dust-tight housings to eliminate



collection of fine iron on the magnetic castings. Face plates may be removed and replaced without disturbing magnetic portions of the unit.

For More Details Circle No. 23—Page 247

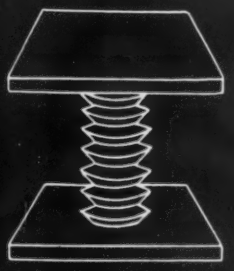
Tractor Shovel: Pettibone Mulliken Corp., 4700 West Division St., Chicago, Ill.—Tractor shovels of 1¼, 1¾ and 2½ cu yd capacities feature power shift transmissions, torque converter and four-wheel drive planetary axles. Units supplement the company's standard four-wheel drive tractors with torque converter. Bucket is designed for a 30-degree tilt up from ground position. An automatic device levels the bucket. Each model is offered with either a gaso-

line or diesel engine. Accessories available include a snow bucket, lift fork, crane hook, snow plows and a bulldozer blade.

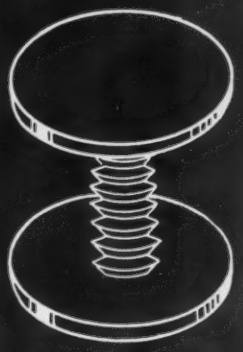
For More Details Circle No. 24—Page 247

Building Roofs: Brookville Mfg. Co., Brookville, Pa.—Pre-engineered, all-steel, fully insulated roofs for buildings with masonry or steel side

MILWAUKEE DOUBLE HEAD CHAPLETS



STEM DIA. 1/8" to 1 1/4"



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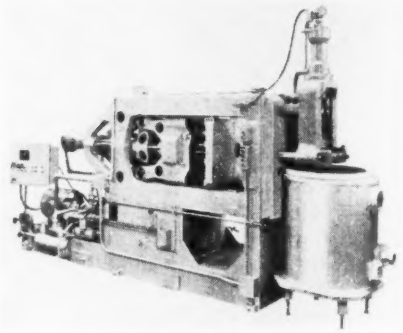
walls are available in clear span structures of 40, 48, 60 and 80 ft. They reportedly meet AISC code requirements, being designed for 30 lb per sq ft live loading and 20 lb per sq ft wind loading. They can be furnished with ventilators, louvres or plastic sky lights.

For More Details Circle No. 25—Page 247

Die Casting Machine: Lester-Phoenix Inc., 2711 Church Ave., Dept. N-14, Cleveland 13, O.—Die casting machine of 600 tons capacity is designed to cast up to 15¼ lb of zinc or proportionate weights of lead or tin. Beam area of the one-piece alloy steel frame is equal to 8 in. tie bars. Die opening is 14 in. Unobstructed movable platen is 40 in. wide with a vertical clearance between



the beams of 28¼ in. Opening in top of frame is 24 x 42 in. to provide accessibility from all sides. Solid backing to the dies is provided by high speed double toggle linkage in multiple shear bolstered by a large diam adjusting screw. Exposed hydraulics meet JIC standards. Pumping system uses a 20 hp motor. Machine is not convertible to aluminum.

For More Details Circle No. 26—Page 247

Floor Finish: Monroe Co., 10703 Quebec Ave., Cleveland 6, O.—Improvements in a colorless, liquid plastic floor finish facilitate application and make it 100 per cent nonskid, according to the manufacturer. Applied with a mop or an applicator, it dries within 20 minutes, is long wearing and does not change color of flooring. It is recommended for use over asphalt and rubber tile, linoleum, cork, terrazzo, magnesite and varnished, painted or enameled wood floors. It is noncombustible and noninflammable.

For More Details Circle No. 27—Page 247

Cylindrical Gages: Horberg Gage Co., 23 Staples St., Bridgeport, Conn.—Firm has augmented its line of pin-type gages with a series of cylindrical gages covering the range from 0.265 to 0.504-in. in steps of 0.001-in. The new gages are straight cylinders 1½ in. long, formed of oil-hardened tool steel and fine-ground finished to a dimension-

al accuracy of +0.0001, −0.000-in. Roundness has been held to within 0.000025-in. and end squareness to within 0.0001-in.

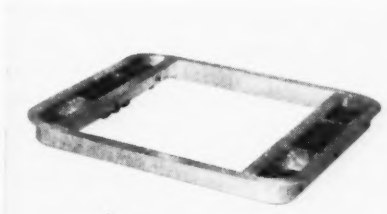
For More Details Circle No. 28—Page 247

Inspection Light: F. T. S. Corp., 309 Vine St., Camden 2, N. J.—Multipurpose inspection light, said to permit close examination of other-

wise inaccessible or hard-to-see areas, bends light around corners by means of a combination light-focusing rod and magnifying mirror. Kit contains flashlight, 2 batteries and bulb, 4 detachable lucite rods and 3 detachable angle-form mirrors, ½, ¾ and 1 in. in diam. Mirrors are the magnifying type rated at 1½ power. Pocket-sized plastic case holds the set.

For More Details Circle No. 29—Page 247

Pallet Dollies: Magnesium Co. of America, East Chicago 19, Ind.—Magnesium pallet dollies feature ex-



truded magnesium frames, hardened steel axles and phenolic resin rollers with sealed bearings. Tilted construction, rounded side rollers and heavy duty roller bearings aid ease of movement and 360 degree turning, according to the manufacturer. Capacities to 4000 lb can be supplied in a range of sizes between 36 x 36 in. and 48 x 48 in.

For More Details Circle No. 30—Page 247

Hydraulic Fluid: Monsanto Chemical Co., St. Louis 4, Mo.—Fire-resistant synthetic hydraulic fluid reportedly has been given a fire hazard rating of 2-3, or less flammable

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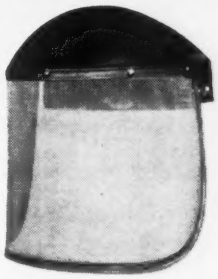
No. 759



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Both Shield No. 759 and 758 provide adequate protection against hot sparks and chips. They are useful for metal pouring and other hot jobs and are bright-finished for heat deflection. Increased comfort and heat insulation are provided by adjustable formed fiber headgear which is fitted with leather sweatband. Shield No. 758 is provided with a deflector crown which gives added protection to the forehead.

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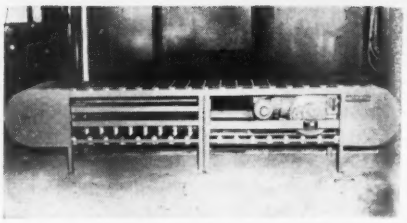
than petroleum oil. Fluid is for use in hydraulic equipment operated near heat or other potential ignition sources.

For More Details Circle No. 31—Page 247

Temperature Controller: West Instrument Corp., 4363 West Montrose Ave., Chicago, Ill.—Stepless temperature controller for use with electric furnaces, kilns or other electric loads modulates the power input to an electric load so that heat input is equal to heat losses. Unit will vary power input to load between 3 and 90 per cent automatically according to demand. Units have been made from 300 va to 110 kva, single or three phase. Higher ratings are available.

For More Details Circle No. 32—Page 247

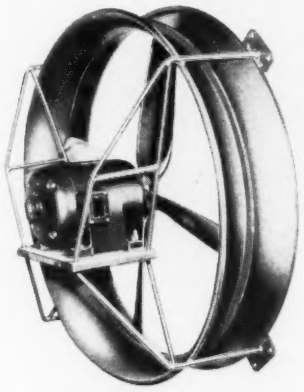
Steel Belt Conveyor: West Bend Equipment Corp., 341 Water St., West Bend, Wis.—Steel belt conveyors are made of cold finished steel sections, continuously hinged with bolt pins and built to any length in belt widths up to 60 in. Belt rides on ball bearing steel rollers and same rollers carry the belt on the return trip. Variable speed drive pulleys



provide a speed ratio of 3 to 1 to obtain speeds up to 100 fpm. Conveyor is most profitably used in applications demanding up to 300 psi under severe operating conditions, according to the maker.

For More Details Circle No. 33—Page 247

Reversible Fan: Hartzell Propeller Fan Co., Piqua, O.—Double ring reversible fan is designed for ventilating jobs requiring intake during some periods and exhaust during others. It consists of two curved orifices welded face to face and an aluminum alloy reversible propeller. It is available in direct-connected, belt-drive, pulley-drive and extension shaft models in 28, 36 and 44 in. diam.



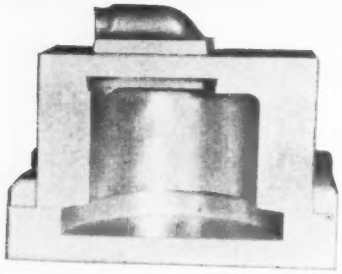
For More Details Circle No. 34—Page 247

Bin Level Indicator: Bin-Dicator Co., 13946 Kercheval Ave., Detroit 15, Mich.—Paddle-type bin level indicator is adaptable to installations in bins under pressure or vacuum, chutes or conveyors handling materials containing lumps which tend to bridge over a diaphragm or bins handling materials which tend to "rat-hole" and prevent operation of a diaphragm. Indicator has a slowly rotating paddle mounted on a flexible shaft which projects into the bin. As material builds up or covers the paddles the paddle is stopped. This in turn stalls a low torque motor and actuates a micro switch which controls signal lights, horns, bells, conveyor machinery, etc.

For More Details Circle No. 35—Page 247

Vises: Athol Machine & Foundry Co., Athol, Mass.—Vises for general workshop use or wherever a heavy

METAL CORE BOX?



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The new Kinney Mobile Vacuum Degasser with its efficient Kinney Model KDH-130 Vacuum Pump provides rapid pump-down to low pressures. The pump is effectively gas ballasted for eliminating contamination by water and other condensable vapors — a primary requirement for efficient foundry operation.

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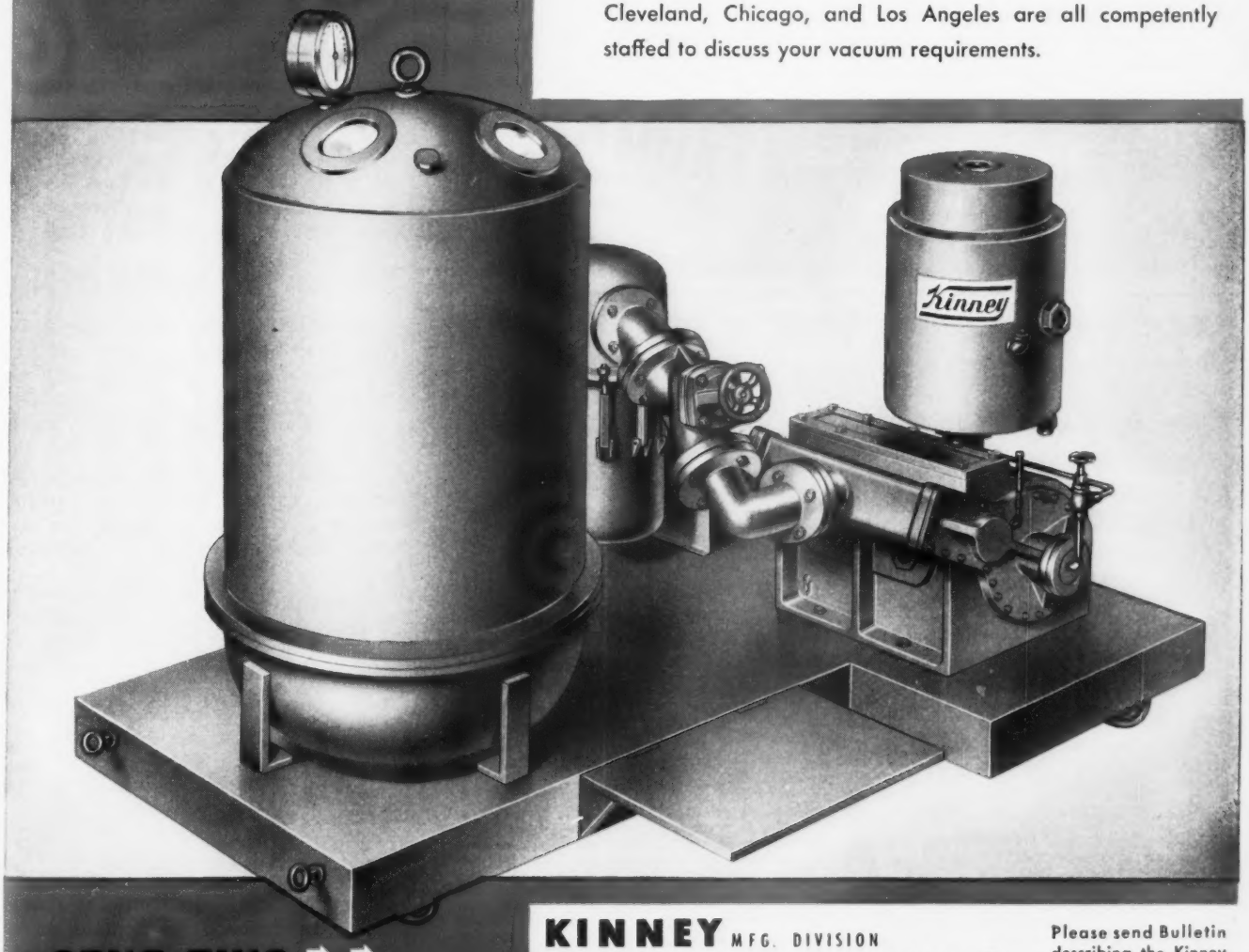

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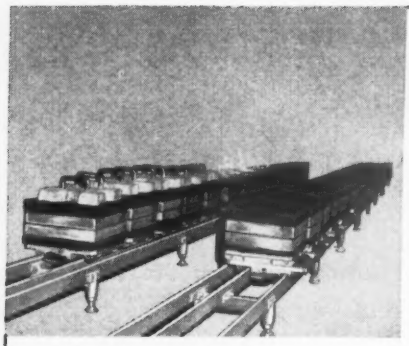

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FOUNDRY EQUIPMENT

Here's what Industry has to say about REDA melting Furnaces . . .

nothing but praise for the REDA FURNACE . . .

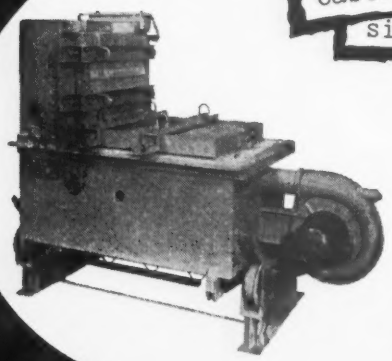
has improved overall foundry operation . . .

doing a wonderful job . . .

much more flexible . . . entirely satisfactory .

castings come cleaner . . .

sincerely recommend it . .



Reda Stack-Loading melting furnaces for ferrous and nonferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer uninterrupted melting runs, and lower melting costs.

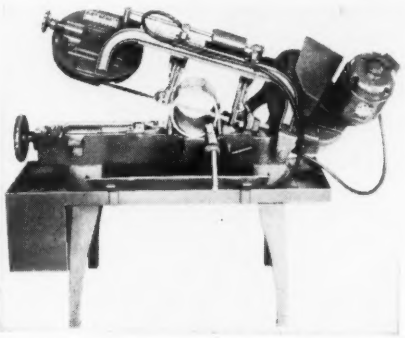
Another feature is the Reda Burner arrangement which can operate from oil and gas simultaneously or be switched from one fuel to the other instantly. *Write or phone for complete details.*

REDA FURNACE
REDA PUMP COMPANY • BARTLESVILLE, OKLA.

machinist's vise is not needed are available in three sizes of jaw width, 3, 3½ and 4 in. Vises are made of semi steel castings and feature solid steel parallel slides, buttress thread on screw, replaceable jaws, "no pinch" handle and full 360 degree swivel base.

For More Details Circle No. 36—Page 247

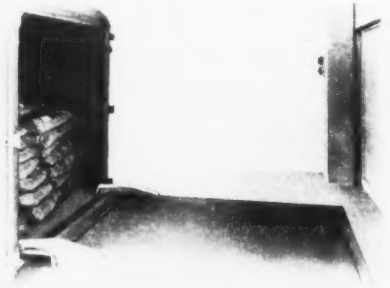
Cut-Off Saw: Wells Mfg. Corp., 310 Service Rd., Three Rivers, Mich. —Horizontal band saw for metal cutting on medium production jobs, gen-



eral utility or tool and stockroom work has a rectangular capacity of 6 x 13 in. and will handle 6¾ in. diam or 6 in. pipe. Blade is 8 ft 2½ in. x ⅝ x 0.032 in. Selective speeds are 50, 90, 160 or 250 fpm. Floor area is 21 x 50 in. Top of bed is 25½ in. above floor.

For More Details Circle No. 37—Page 247

Loading Ramp: Rowe Methods Inc., 2534 Detroit Ave., Cleveland 13, O.—Adjustable loading ramp of 20,000 lb capacity is hydraulically operated and has an automatic safety device and self-leveling action to compensate for varying heights of freight carrier beds plus carrier spring deflection during freight transfer. Safety feature will hold the



deck in its last position should carrier leave dock accidentally. Ramp is ⅜ in. nonskid floor plate on a framework of welded structural forms and shapes. Standard width is 6 ft with a choice of lengths of 5, 6, 7½ and 10 ft.

For More Details Circle No. 38—Page 247

Coupling Link: Columbus McKinnon Chain Corp., Tonawanda, N. Y.—Coupling link consists of a pair of body halves, a tubular stud

KORWELD

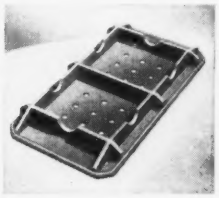
the F.M.C core paste development . . . .

Foundry users claim that it is **80%** *STRONGER*

Develops 1/2 to 2/3 ***LESS GAS*** *than any thing they've ever used*

These two facts are worth remembering. They are the main reasons why **Korweld** is not simply another core paste. **Korweld** actually welds core seams by its ability to penetrate deeply into the core and around the sand particles. Instead of forming merely a surface weld, it grips into the actual grain. **Korweld** dries faster and gives a greater tensile strength than ordinary core paste. This largely eliminates "waiting time," which is a special advantage in production work. **Korweld** is a scientific blending of materials which greatly increases moisture resistance, giving added strength and safety in core storage. It reduces the possibility of core slipping or falling apart in the mold cavity. **Korweld** helps eliminate trouble from gas formation. It is often used as a daub. You can't join the list of satisfied users until you try **Korweld.**

FMC ALUMINUM BOTTOM BOARDS



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IMPROVES PRODUCTION 10 WAYS —
(1) Long life—do not deteriorate. (2) Hold up at high temperatures. (3) Eliminate bottom board building and repair costs. (4) Speed production. (5) Improve casting quality. (6) Reduce number of rejects. (7) Engineered to permit release of gases. (8) Beaded edge adds strength — eliminates possibility of breakage. (9) Space saving — stack in half the space of wood boards. (10) Correctly designed in every size and shape for your particular needs.

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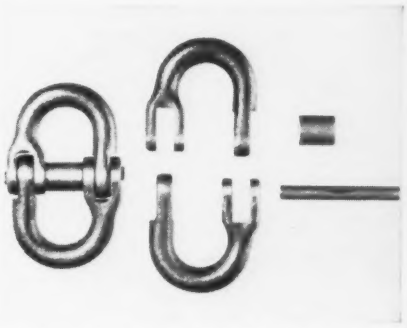
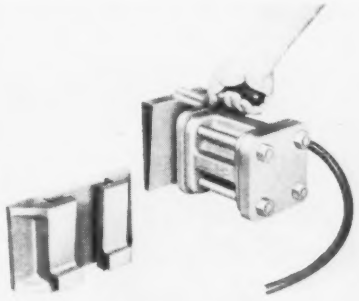
and a hardened alloy pin. When assembled, the unit is securely locked by the steel pin which bites into the steel stud. No peening or welding is required and the link can be disas-



sembled and reused. The link enables alloy chain users to make up their own sling and special assemblies and eliminates the time often required for ordering and shipping new or repaired assemblies from a factory.

For More Details Circle No. 39—Page 247

Vibrator: Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland, O. —Lightweight portable vibrator is for heavy duty use on portable bins, trucks, forms or tanks that do not require permanent vibrator installation. It develops 7000 to 8000 vibrations per minute at maximum effi-



ciency. Vibrator is available with sturdy cast steel bracket for easy attachment.

For More Details Circle No. 40—Page 247

Nonskid Coating: Garland Co., 3748 East 91st St., Cleveland 5, O.—Semiplastic, nonskid coating for stairs, steel floor plates, ramps, inclines and shower and locker room floors is said to eliminate falling and slipping. Applied with a trowel on wood, metal or concrete, it is formulated with chlorinated rubber. The coating is acid, alkali and grease resistant and will withstand continual scrubbing and washing. Four colors are available.

For More Details Circle No. 41—Page 247

Core Drier Compound: Stanley Chemical Co., East Berlin, Conn.—Epoxy-type plastic core drier compound, for use with electronic core-baking equipment, is said to have a low thermal conductivity rate, ex-

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PRECISE CORE SUPPORT

Sand packs tight through open coil for rigid support in mold.

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DIMENSIONALLY UNIFORM

Uniform stems simplify molding, prevent annoying sand break-outs.

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EVENLY TINNED for CONTROLLED FUSION

Even tinning over clean metal gives uniform fusion for core support during critical stage.

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... has tripled our annealing capacity. We particularly like its mechanical features—the Fluid-drive unit for the car, the automatic, power-operated door, and the one push button firing. The mechanical seals are a tremendous improvement over the old sand seals.

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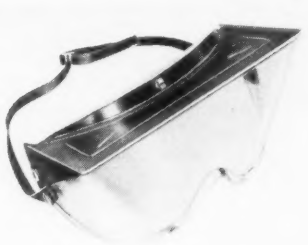
For Better Melting

cellent insulation properties, high strength and abrasion resistance. Compound can be used for either transfer-type or blow-in type core driers. Manufacturer recommends that urea sand binders be used with the raw material.

For More Details Circle No. 42—Page 247

Eye Shield: Pulmosan Safety Equipment Corp., 644 Pacific St., Brooklyn 17, N. Y.—Lightweight eye shield weighs 1½ oz and is designed to fit around the eyes, nose-bridge, upper face and temples with no in-



terference from seams or joints. Transparent clear or transparent green plastic shields are available. An opaque green visor eliminates overhead glare. Foam rubber sweatbands and elastic headband are replaceable. Prescription glasses can be worn with the shield.

For More Details Circle No. 43—Page 247

Plastic Steel: Chemical Development Corp., Danvers, Mass.—A product combining 80 per cent steel and 20 per cent plastic is said to handle like modeling clay and two hours after the addition of a special hardening agent becomes a rigid, tough, strong, steel-like mass. No heat or pressure is required. Originally developed for making tools, jigs, fixtures and molds, the compound is being used for making, forming or stamping dies for metal, filling holes in castings, bonding steel to itself or to aluminum, bronze, brass iron and porcelain, rebuilding broken machinery and building up the inside of pumps, valves and other worn sections.

For More Details Circle No. 44—Page 247

Hard Coating: Montaine Corp., 7127 South Chicago Ave., Chicago 19, Ill.—Super refractory, gem hard aluminum oxide coating offers protection from wear, heat and many types of corrosion when applied to a variety of metallic and nonmetallic materials, including steel, titanium, carbon, aluminum, magnesium, brass, copper and glass. It may be used for coating metal molds or melting pots. Material has a melting point above 3600° F and reportedly provides excellent electrical and thermal

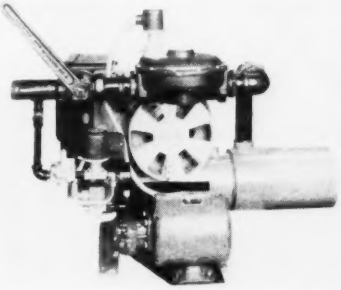
insulation and is resistant to chipping, even under direct impact. Operation involves melting ceramic powders in a flame directed at the object to be coated. Powder is nontoxic and noncombustible.

For More Details Circle No. 45—Page 247

Tooling Process: Research & Engineering Inc., 1201 North 5th St., Minneapolis 11, Minn.—Process for production of jigs, fixtures, dies, patterns, checking gages, coreboxes and similar metalworking tools uses an alloy of epoxy resin and metal, which in turn is bonded to metal. Manufacturer claims that in practical applications the tools will either meet the tolerances of machined tools or will be produced to closer tolerances. Tools are said to be made in a matter of hours. Weight is comparable to or less than aluminum.

For More Details Circle No. 46—Page 247

Gas Burners: Cleaver-Brooks Co., Burner Division, 326 East Keefe Ave., Milwaukee 12, Wis.—Six gas and gas/oil burners are available in capacities ranging from 720,000 to 8,600,000 Btu. All secondary air in the burners is furnished by the



burner. Air is metered in quantity to provide an air to fuel ratio for efficient combustion. Oil and gas interchange is accomplished instantaneously by flip of a switch. Air is controlled through a damper modulating between high and low fire.

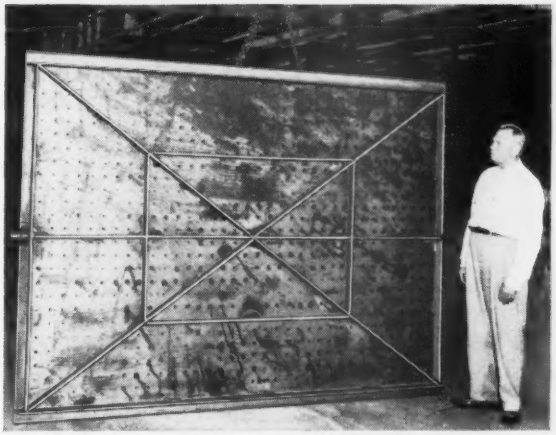
For More Details Circle No. 47—Page 247

Welding Electrode: Marquette Mfg. Co., 307 East Hennepin Ave., Dept. NS, Minneapolis, Minn.—Welding electrode with a powdered iron coating alloys pure nickel with iron to produce dense, high strength, machinable welds in gray, malleable and ductile cast irons, according to the manufacturer. Arc is self-starting and when struck develops a deep cone, causing metal to be applied to work with a direct force to form a high bond penetration with flat bead contour.

For More Details Circle No. 48—Page 247

Core Drier Compound: Stanley Works, New Britain, Conn.—Transfer type core drier compound is designed for dielectric drying ovens and recommended by manufacturer

HERE'S "TOPS" in BOTTOM BOARDS



Mighty BIG is this Sterling-made Bottom Board, and mighty well engineered . . . as all Sterling Core Plates and Bottom Boards are . . . to prevent warping or twisting. All welded steel heavy reinforcing angles and bars assure maximum strength and rigidity. This big bottom board suggests the versatility of Sterling foundry equipment engineers. Another reason why Sterling is "TOPS" in this field.

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Standard Core Plate and Bottom Board Styles are available in various sizes. Special designs, including round bottom boards, can be made to meet your needs.

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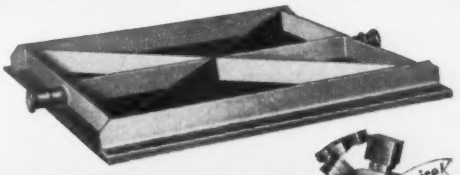

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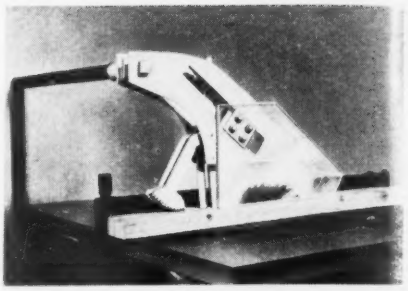
for cores using a urea sand binder. Compound is mixed in prescribed proportions with an activator and poured into a master mold and allowed to harden for a half hour, with additional heat aging for another half hour. Ingredients permit it to develop heat while traveling through the oven, preventing steam condensation from the core and resulting in rapid drying.

For More Details Circle No. 49—Page 247

Hydraulic Power: Rosaen Co., 24601 Harper Ave., St. Clair Shores, Mich.—Standard hydraulic power units in five sizes from ¾ to 20 hp are mounted on stock reservoirs in capacities from 20 to 100 gal. Electric motors, pumps and valves mounted on the tanks which already are equipped with basic accessories provide a "packaged" system for many industrial applications without need for pre-engineering.

For More Details Circle No. 50—Page 247

Saw Safety Guard: General Scientific Equipment Co., 2700 West Huntingdon St., Philadelphia 39, Pa.—Transparent plastic shields will fit any table model circular saw to provide protection during cutoff, ripping, dado and grooving work to various widths and thicknesses. It is not necessary to remove guard. Shields operate separately or together. Mounted on table, floor or ceiling, installation is said to be fast and simple, for either tilting table or tilting arbor saws.



For More Details Circle No. 51—Page 247

Cyclograph: J. W. Dice Co., Englewood, N. J.—Cyclograph is said to provide a rapid and inexpensive means of nondestructively testing and sorting accidentally mixed or incorrectly processed parts. A known and acceptable part is inserted in the test coil as a standard. Unknowns placed in the coil give the same meter reading if they are the same as the standard, a different reading if they are not. Instrument can be used with either ferrous or nonferrous metals. Size and shape presents no problem as test coils are available with any size openings.

For More Details Circle No. 52—Page 247

Lifting Magnet: Electric Controller & Mfg. Co., 4500 Lee Rd., Cleveland, O.—Lifting magnet is 55 in. in diam and weighs 5200 lb. It is designed for scrapyard boom cranes and for handling lightweight scrap. Use of strap aluminum in place of copper strap is a contributing factor in the favorable weight-to-lifting-capacity ratio of the magnet.

For More Details Circle No. 53—Page 247

Exothermic Generator: Ipsen Industries Inc., Rockford, Ill.—Exothermic atmosphere generator for scale-free heat treating operations will produce up to 1250 cfh of exothermic atmosphere from either nat-

HEX dressers

give you six sets of bearings

Hard use—Desmond Hex Dressers are built for it. Six holes in hardened bearing blocks extend the usefulness of Desmond Hex dressers as many times. As bearing holes wear, turn the blocks for a new set of holes. Blocks readily replaceable when all six sets of bearing holes are worn. Five sizes for all needs. Ask your Desmond distributor for technical advice on proper dressing to make your grinding wheels last longer. The Desmond-Stephan Mfg. Co., Urbana, Ohio.

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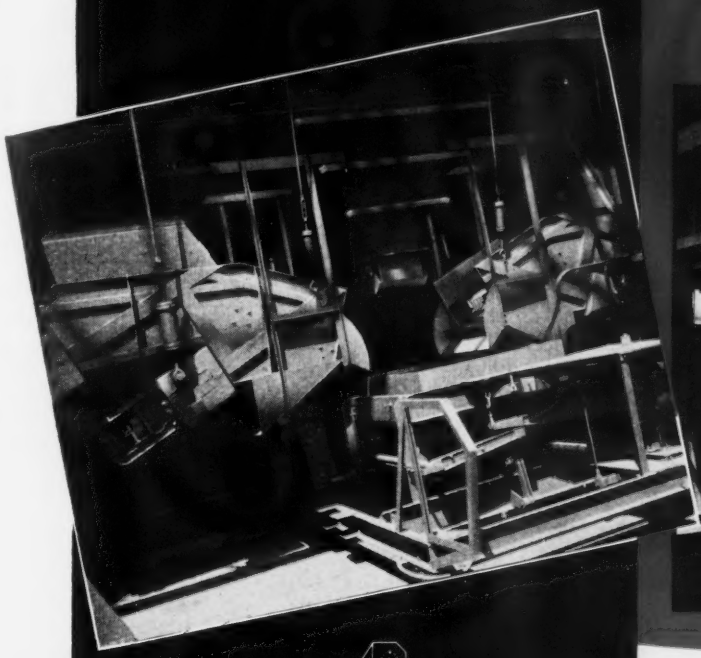

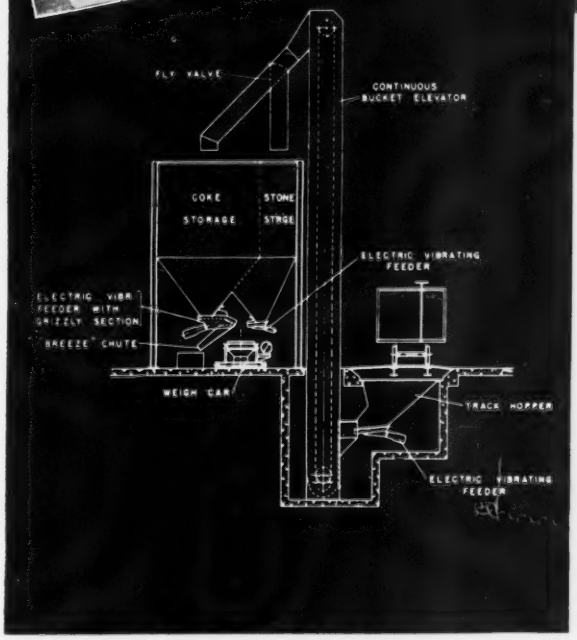

Coke and limestone unloading and handling are under absolute flow control when Jeffrey Electric Vibrating Feeders are on the job.

The simple, efficient system diagrammed at left is typical of many our competent Foundry Engineers have installed. Pan feeders work under track hopper and stone storage bin . . . a third feeder with grizzly section operates under the coke storage bin. The grizzly eliminates coke "breeze" in the charge.

The Jeffrey continuous-type bucket elevator handles both materials from the track hopper, delivering them to separate storage bins by means of a fly valve in the elevator chute.

Perhaps a similar system would ease your coke and stone handling operation. Send for Jeffrey Foundry Equipment Catalog No. 845 or write to Foundry Engineering Division, outlining your problem.

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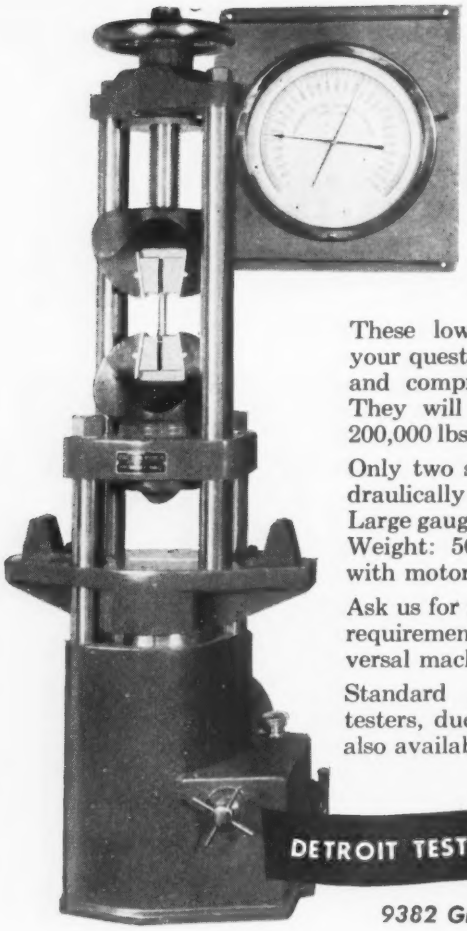

30,000 and 40,000 pound

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Testing Machines

These low-cost machines will answer all your questions about the tensile, transverse, and compression strength of metal parts. They will apply up to the equivalent of 200,000 lbs. per sq. inch (on a .505 specimen).

Only two simple controls operate these hydraulically powered, automatic machines. Large gauge gives accurate reading instantly. Weight: 500 lbs., height: 4'-4". Equipped with motor, gauge, grips, and blocks.

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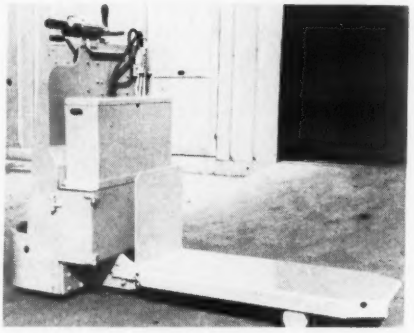
SUPER-CONCRETE STAVE STORAGE BINS

ural or manufactured gas. Unit consists of a combustion chamber, air gas metering and mixing system premix gas burner, water cooled gas coolers, and a water trap with necessary automatic controls, regulators and safety devices. Company can now supply a range of exothermic generators from 500 to 1250 cfh and endothermic generators from 500 to 5000 cfh.

For More Details Circle No. 54—Page 247

Platform Truck: Automatic Transportation Co., 149 West 87th St., Chicago 20, Ill.—Platform truck for handling narrow loads weighing as much as two tons has a platform 20 in. wide. Manufacturer says the truck has a self-balancing feature which automatically compensates for uneven floor surfaces and eliminates frame distortion and uneven load



distribution. Trucks can be obtained with platform heights of 6, 7, 9, or 11 in. Platform lengths can be specified to suit individual materials handling requirements.

For More Details Circle No. 55—Page 247

Gage Testers: Amthor Testing Instrument Co., 45 Van Sinderen Ave., Brooklyn 7, N. Y.—Portable deadweight pressure gage testers are for periodic checking of pressure gages to secure proper and safe operation of equipment. Testers are guaranteed to be accurate within 1/10 of 1 per cent of the indicated reading. Complete unit with accessories is contained in metal case. Special container for carrying the weights also is provided. Three models are available—up to 3000 psi, 4000-6000 psi and up to 10,000 psi.

For More Details Circle No. 56—Page 247

Belt Conveyor: New London Engineering Co., 1700 South Division St., New London, Wis.—Horizontal belt conveyor for production, assembly, inspection and packaging operations can be supplied in lengths from 5 to 80 ft. Frames are made of aluminum, steel or stainless steel in 10 ft sections. Three standard widths are available—12, 15 and 21 ft. Belts are of cotton, canvas, rubber, neoprene, plastic or wire mesh from 2

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mullite refractory

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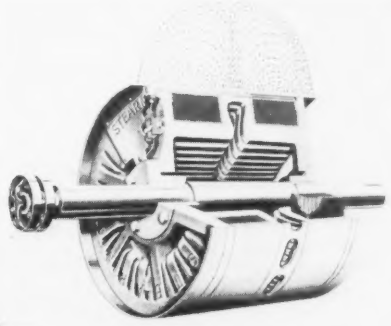
THE MULLITE REFRACTORIES CO.
SHELTON 4, CONNECTICUT

to 18 in. wide. Belt speeds are fixed or variable. Standard drive is by electric motor and speed reducer.
For More Details Circle No. 57—Page 247

Metal Marker: John P. Nicsen Jr. Co., Glenside, Pa.—Fast drying permanent marking ink in burst-proof tube with ball point affords a

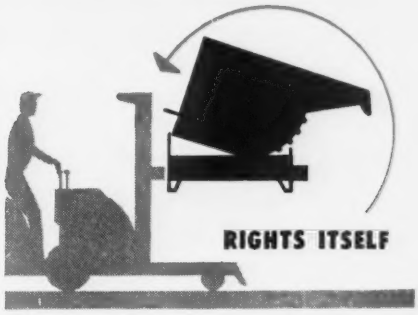
marking implement for making identifying marks on rough or smooth surfaces on castings, bar stock, machinery, tools or dies. Different size ball points and seven standard colors are available. Ink is said not to chip readily, will not peel or be affected by heat or weathering.
For More Details Circle No. 58—Page 247

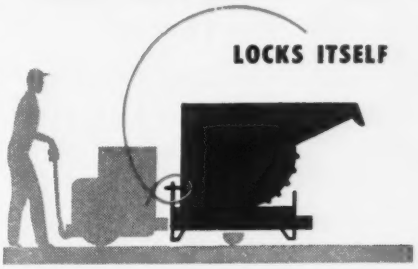
Magnetic Pulley: Stearns Magnetic Inc., 635 South 28th St., Milwaukee 46, Wis.—Two-coil electromagnetic pulley is said to have high



tramp iron removal efficiency on many conveyor operations. Design reportedly produces an effective flux pattern with a deep magnetic field at the center of the pulley—a pattern which conforms to normal conveyor load conditions. Magnet is available in a variety of widths and diameters.
For More Details Circle No. 59—Page 247

Floor Surface Material: Roc-Wood Flooring Industries Inc., 907 North Larrabee St., Chicago, Ill.—Chemically compounded floor surfacing material is for renewing, smoothing or patching of commercial, institutional and industrial floors. Mixture is applied at room temperature and trowelled to a smooth finish. It reportedly is impervious to many acids and unaffected by heat or cold.
For More Details Circle No. 60—Page 247





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Fits securely on any standard fork or platform lift truck . . . can't slip off. Pick-up is quick and easy. Insures fast, efficient handling of any wet or dry, hot or cold bulk materials. *Cuts hand unloading by at least 50%* . . . with maximum safety.

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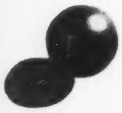
ROURA IRON WORKS, INC.
1417 Woodland Ave., Detroit 11, Michigan

A NEW PLANT

FOR A NEW 20th Century *persuasive abrasive*



Recently we put our new Toledo, Ohio plant into production. It is specifically designed for you.

From laboratory microscopes to grading screens, every facility of this plant has been selected to furnish you the best metallic abrasive for the lowest possible price.

This modern factory — The Toledo Steel Shot Division — will be devoted to the production of a brand new steel shot, Toledo REALSTEEL — the newest member in our complete line of 20th Century quality shot and grit.

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800 East 67th St., Cleveland 8, Ohio
Howell Works: Howell, Michigan
Toledo Steel Shot Division: Toledo, Ohio

One of the world's largest producers of quality shot, grit and powder—Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)

**Copyrighted trade name*

Foundry Statistics

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	970,506	578,749	.....
1954			
June	72,820	41,121	60,163
6 mo.	438,899	240,712	.....
July	50,893	25,243	63,711
Aug.	59,259	34,528	62,494
Sept.	58,015	33,929	66,742
Oct.	64,321	36,956	71,090
Nov.	70,030	41,609	80,686
Dec.	80,599	49,005	85,064
Total	812,016	461,982	.....
1955			
Jan.	82,028	48,000	99,817
Feb.	85,979	48,721	101,766
Mar.	102,364	60,063	99,730
Apr.	101,226	57,397	104,091
May	98,397	57,317	106,446
June	99,456	60,261	107,559
6 mo.	569,450	331,759	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1953	658,022	214,553	200,025	239,330	.....
1954					
June	48,061	12,442	17,105	17,886	79,126
6 mo.	307,573	82,838	104,980	116,728	.....
July	39,636	11,299	13,749	14,004	76,513
Aug.	42,429	11,252	15,335	15,213	76,684
Sept.	46,249	10,717	16,641	18,228	79,873
Oct.	53,901	12,765	19,238	21,245	88,518
Nov.	55,224	12,934	20,396	21,296	94,491
Dec.	64,045	13,753	23,629	26,017	99,556
Total	609,057	155,558	213,968	232,731	.....
1955					
Jan.	64,414	13,358	23,679	26,819	102,382
Feb.	66,869	13,579	24,319	28,234	108,939
Mar.	78,958	16,019	29,029	33,229	110,046
Apr.	73,049	14,041	28,028	30,208	109,156
May	71,691	14,235	25 597	31,243	104,984
June	68,473	14,920	24,682	27,939	102,799
6 mo.	423,454	86,152	155,334	177,672	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1953	990,496	888,369	61,316	.....
1954				
June	70,777	64,328	3,567	30,743
6 mo.	428,302	383,114	26,538	.....
July	56,380	51,070	3,073	30,872
Aug.	68,891	63,389	3,547	28,883
Sept.	68,267	62,152	3,637	31,087
Oct.	70,276	63,855	3,619	30,296
Nov.	70,020	63,065	4,089	27,508
Dec.	72,421	65,159	4,346	31,954
Total	834,557	751,804	48,849	.....
1955				
Jan.	72,233	64,540	4,678	30,864
Feb.	75,253	67,768	4,598	37,520
Mar.	92,149	83,149	5,649	42,940
Apr.	84,183	75,903	5,152	51,111
May	85,008	76,064	5,513	49,198
June	90,476	80,869	5,840	45,820
6 mo.	499,302	448,293	50,590	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	34,517	31,469	.....
1954			
June	2,034	1,820	8,296
6 mo.	12,892	11,421	.....
July	1,924	1,712	8,073
Aug.	2,157	1,944	7,795
Sept.	2,059	1,855	7,474
Oct.	2,092	1,876	7,294
Nov.	2,161	1,906	6,867
Dec.	2,287	2,031	6,678
Total	25,572	22,745	.....
1955			
Jan.	2,305	2,067	7,236
Feb.	2,160	2,009	7,376
Mar.	2,572	2,311	7,011
Apr.	2,633	2,405	6,800
May	2,399	2,174	6,530
June	2,367	2,098	6,346
6 mo.	14,436	13,064	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	May 1955	Apr. 1955	May 1954
Ferrous	210,100	205,300	184,900
Nonferrous	71,200	71,400	59,300

Average Weekly Earnings

Gray Iron	85.97	83.56	72.56
Malleable Iron	88.10	84.60	72.01
Steel	85.90	85.08	73.48
Nonferrous	85.90	83.84	79.00

Average Weekly Hours

Gray Iron	43.2	42.2	38.8
Malleable Iron	43.4	42.3	37.7
Steel	41.3	41.1	37.3
Nonferrous	41.1	40.5	39.5

Labor Turnover Rate (May)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.8	4.1	2.8	0.6
Malleable Iron	5.2	3.6	2.4	0.2
Steel	5.7	3.1	1.6	0.7
Nonferrous	3.5	3.8	1.9	1.2

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

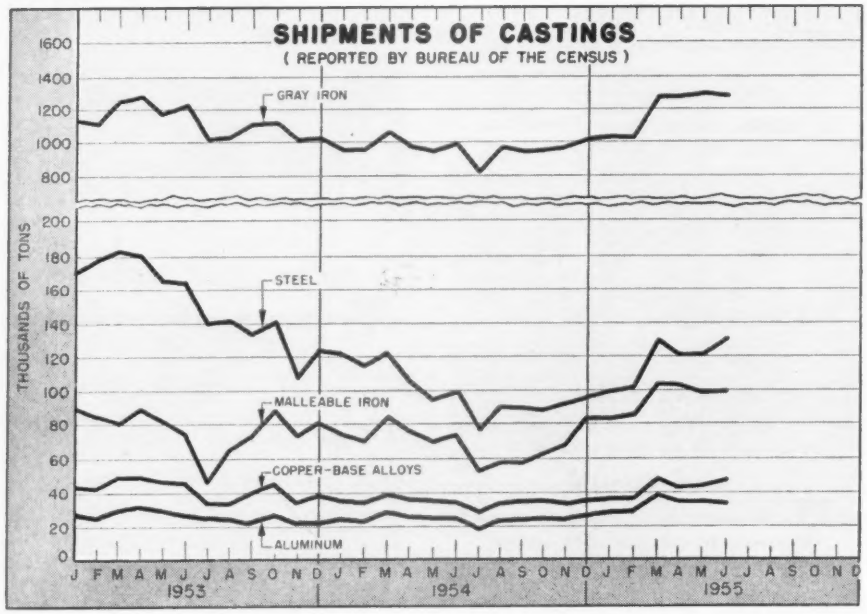
	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1953	13,707,902	7,494,843	8,449,837	3,675,454	2,829,159	1,389,483	467,142	1,285,598	677,166	.....
1954										
June	986,810	556,047	616,317	261,133	141,712	70,060	30,883	130,503	67,395	803,570
6 mo.	5,840,635	3,134,387	3,777,940	1,567,986	855,292	380,438	181,898	665,897	395,621	.....
July	821,151	449,621	510,173	209,294	131,180	62,681	22,902	98,810	59,086	828,924
Aug.	934,644	541,904	569,790	250,702	140,165	69,897	29,134	127,255	68,300	829,505
Sept.	921,232	533,909	559,934	248,124	139,679	68,053	25,374	124,821	71,424	810,654
Oct.	942,934	552,022	570,365	253,802	150,282	79,191	23,599	130,326	68,362	789,117
Nov.	997,301	547,447	623,390	258,933	167,983	85,703	25,723	118,480	61,725	759,613
Dec.	1,074,258	563,699	680,700	276,045	200,044	97,936	27,229	111,082	55,203	744,633
Total	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,721	.....
1955										
Jan.	1,091,923	563,153	712,097	282,386	192,132	97,007	25,783	100,638	61,273	782,656
Feb.	1,106,165	578,171	720,304	291,675	196,118	99,794	27,401	95,285	67,057	852,168
Mar.	1,314,918	688,733	847,874	334,287	217,571	109,681	36,732	129,746	82,995	934,224
Apr.	1,293,678	679,867	819,872	319,149	216,116	108,490	35,415	145,871	76,404	966,057
May	1,310,424	707,105	803,897	315,072	227,236	117,915	35,966	168,772	74,553	937,949
June	1,296,196	715,862	793,067	327,520	228,044	117,727	43,807	147,351	83,927	981,918
6 mo.	7,413,304	3,932,891	4,697,111	1,870,089	1,277,217	650,614	205,104	787,663	446,252	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1953	1,834,197	1,400,013	321,010	1,276,729	959,493	293,491	557,468	417,148	27,519	.....
1954										
June	100,022	72,881	8,639	69,021	48,370	7,552	31,001	24,554	1,087	169,594
6 mo.	662,008	496,778	82,943	456,256	335,453	74,818	205,752	162,069	8,943	.....
July	75,848	53,207	5,815	50,453	33,461	4,964	25,395	19,746	851	170,567
Aug.	89,590	66,792	9,844	61,344	44,236	8,148	28,256	22,556	1,196	168,303
Sept.	88,359	64,722	8,668	59,039	41,735	7,690	29,320	22,987	978	158,823
Oct.	87,085	64,004	8,580	56,705	39,872	7,596	30,380	24,132	984	154,079
Nov.	87,659	64,812	7,742	56,057	40,085	6,624	31,602	24,727	1,118	175,715
Dec.	93,547	69,843	12,489	62,967	45,632	10,469	30,841	24,211	1,245	179,148
Total	1,184,096	880,158	135,581	802,821	580,474	120,309	381,285	303,428	15,315	.....
1955										
Jan.	98,238	75,044	13,809	67,397	49,816	12,762	30,841	25,228	1,047	201,839
Feb.	106,430	80,729	16,501	74,709	55,014	15,381	38,945	25,715	1,120	202,301
Mar.	127,460	98,926	19,339	88,867	68,013	17,887	34,933	30,913	1,452	215,059
Apr.	120,053	92,237	16,646	84,247	63,244	15,163	35,806	28,993	1,483	221,336
May	122,465	92,713	16,810	85,950	63,182	15,335	36,515	29,531	1,475	225,302
June	133,887	102,457	19,591	93,417	69,986	17,979	40,470	32,471	1,612	251,416
6 mo.	708,533	542,106	102,696	494,587	369,255	94,507	217,510	172,851	8,189	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

FOUNDRY STATISTICS



COMMERCIAL HEAT TREATING

(National Billings of Metal Institute Members)

	1953		1954		1955	
	No. Reporting	Total Reported	No. Reporting	Total Reported	No. Reporting	Total Reported
Apr.	55	2,904,736	60	2,179,445	62	2,452 500
May	56	2,819,628	62	1,871,175	62	2,516,300
June	51	2,591,154	61	1,996,770	62	2,488,800
July	58	2,522,651	61	1,722,499	63	2,035 100
7 mo.		19,290,632		14,606,110		16,199,500
Annual total		31,733,067		24,244,368		.....

COKE PRODUCTION AND CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1953	78,467,806	78,227,414	2,915,420
1954			
June	4,610 064	4,683 726	194 664
6 mo.	29 983,677	29 648,052	1,275,445
July	4,618,665	4,555,701	170 617
Aug.	4,510,603	4,501,477	195,344
Sept.	4,490 603	4,431,650	191,607
Oct.	5 082,374	5,100 135	208,418
Nov.	5 230,237	5,283,916	221,391
Dec.	5,610,564	5,615,228	217,104
Total	59,526,723	59,139,159	2,479,926
1955			
Jan.	5 805,926	5,862,113	234,784
Feb.	5 394,166	5,519 241	242,282
Mar.	6,235,909	6,306,723	286,072
Apr.	6,135,645	6,164 459	278 242
May	6,426,747	6,570 567	277,967
June	6,155,087	6,297,897	249 828
6 mo.	36,153,480	36,721,000	1,569,175

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1954	1955
Jan.	20,661	25,201
Feb.	19,920	25,349
Mar.	23,653	29,713
Apr.	24,746	27,641
May	22,269	23,708
June	22 348	23,141
July	17,074	18,513
Aug.	21,684	.....
Sept.	22,464	.....
Oct.	24 080	.....
Nov.	23,061	.....
Dec.	21,273	.....
Total for year	263,233	.....

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1953	521,253	349,022	.....
1954			
June	40,708	26 890	47,537
6 mo.	255 706	161 184	.....
July	28 306	18,605	43,231
Aug.	34,639	24,898	46,288
Sept.	36,594	25 617	56,006
Oct.	39 072	27,337	64,500
Nov.	48,437	35 207	62,750
Dec.	54,410	35,211	69,403
Total	434,785	295,587	.....
1955			
Jan.	58,586	35,472	70,691
Feb.	58,585	35,893	73,858
Mar.	71,811	44,048	81,363
Apr.	71,595	45,477	81,756
May	63,735	38,124	74,472
June	66 569	42,753	71,344
6 mo.	390,881	241,767	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1954	1955
Jan.	173.8	81.0
Feb.	99.9	90.4
Mar.	82.7	163.6
Apr.	125.3	178.6
May	80.8	145.7
June	86 4	186.8
July	68.8	....
Aug.	75.6	....
Sept.	68.3	....
Oct.	147.5	....
Nov.	61.4	....
Dec.	113.9	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

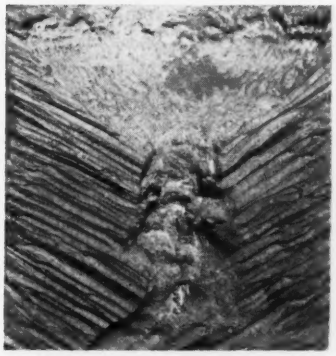
	All Scrap Total	By Types of Furnace—Cupola Total	Air Total	Electric Total
1953	69,005,976	9,676,463	1,026,334	8,263,880
1954				
May	4,776,603	710,159	67 368	506,582
5 mo.	22,956 762	3,658,324	367 353	2,509,963
June	4,664,561	725,910	75,306	515,019
July	3,909,336	565,275	45,920	420 564
Aug.	4,164,703	671,631	65 336	486,596
Sept.	4,298,495	675,593	68,860	500,349
Oct.	4,782,488	710,127	67,678	528,432
Nov.	4 928,850	737,286	71,844	573,298
Dec.	5,075 563	798,435	82,910	566 223
Total	54,780,758	8,542,581	855,207	6,100,444
1955				
Jan.	5,416,052	813,682	90,622	614,824
Feb.	5,350,452	823 465	91 916	577,296
Mar.	6 313 717	993,266	113,198	727,401
Apr.	6,239 036	975,751	108,965	726,138
May	6,415,947	963,082	109,074	745,060
5 mo.	29,735,204	4,569,246	513,775	3,390,719

PIG IRON PRODUCTION AND CONSUMPTION

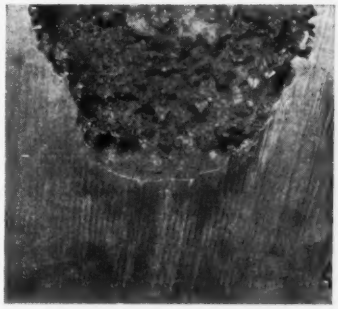
	Production** (standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1953	74,879,511	2,599,307	3,736,431	60,465,016	8,347,825	66,637,364	4,918,480	272.311	164,267
1954									
July	4.590.076	182.130	182.527	3.790.999	434.420	3.990.431	293.926	12.258	13.317
7 mo.	33,498,143	1,221,962	1,681,576	27,416,692	3,177,913	30,093,226	2,517,338	130,055	92,123
Aug.	4,529.291	186,097	165,891	3,722,094	455.209	4,013 552	354,067	15,926	10,325
Sept.	4,417,888	188,599	179,629	3,622,799	426,861	4,005 578	346 698	16,984	11,654
Oct.	4,937,436	212,237	248 643	3,979,437	497,119	4,518,770	367,063	16,186	11,307
Nov.	5,204,446	202,824	263,484	4,233,253	504,885	4,764,215	375,526	16,178	15,932
Dec.	5,526,720	229,717	259,423	4,510,772	526,808	4,978,200	403,726	19,829	13,917
Total	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	52,373,541	4,364,418	215,158	155,258
1955									
Jan.	5,729,404	243,608	272,451	4,703,875	509,470	5,202,360	409,281	18,874	20,016
Feb.	5,394,585	209,852	252,860	4,425,080	506,793	4,964,515	409,141	20,576	22,551
Mar.	6,406,902	221,437	359,413	5,239,116	586,936	5,830,943	480,639	24,066	15,931
Apr.	6,329,927	210,085	305,188	5,068,506	746,148	5,725 258	467,709	21,536	12,857
May	6,753,236	246,661	342,544	5,385,299	778,732	6,044,882	471,657	21,448	20,085
June	6,494,838	238,412	347,631	5,245,861	662,934	.....	.....	.....	.....
July	6,329 393	233,235	344,365	5,116,960	634,833	.....	.....	.....	.....
7 mo.	43,438,285	1,603,290	2,224,452	35,184,697	4,425,846	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

USITE



Typical Depression Cast Steel Riser



Typical Depression Steel Ingot

is an efficient insulator for maintaining the temperature of metal in hot tops, risers and transfer ladles.

When used "pound for pound" in comparison with other hot top insulators, it will give

GREATER YIELD WITHOUT CONTAMINATION at LESS COST.

HERE ARE THE REASONS WHY:

- **USITE** is a fine powder, and therefore spreads readily.
- **USITE** is free of graphite and other forms of carbon soluble in molten steel.
- **USITE** is chemically inert, and will not contaminate the melt.
- **USITE** does not affect the carbon content of the steel.
- **USITE** promotes the formation of flat shrinkage in the head.
- **USITE** keeps the metal fluid in the hot top or riser.
- **USITE** prevents the formation of secondary pipe.

Manufactured in the U.S. from domestic materials, USITE is shipped in non-returnable barrels containing approximately 500 lbs. Other USITE products are: USITE HOT TOP BLANKET, guaranteed free from graphite; USITE TYPE F-1, (EXOTHERMIC), for steel ingots, cast steel risers and gray iron risers. A test in your own plant will convince you of the superior qualities and economies of USITE. Our technical staff will be glad to answer any chemical or metallurgical questions involving our products.

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ANNEEL-PAK

Guaranteed free of graphite, it flows like red hot rain at 2100°. Has a very fast rate of convection.

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Install a durable CARBOFRAX® silicon carbide slag hole block in one of your cupolas and see how long it outlasts ordinary blocks. Users report 20 or more hours uninterrupted service in continuous pour cupolas...with practically no change in hole size. Single standard size CARBOFRAX block costs only $4.70. Other sizes are available from stock molds. Order one today, put it in and keep a check on downtime. You'll order more! Address Dept. AA105, Refractories Division, The Carborundum Company, Perth Amboy, N. J.

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Wood and Metal Patterns
18840 John R. St., Detroit, Michigan

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"One Thing at a Time"

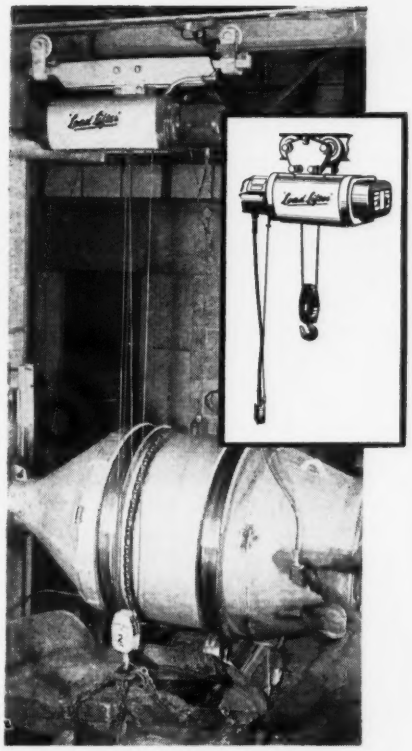
A FRIEND of mine who has enjoyed considerable success as a teacher of speech, has explained a part of his method of correcting the stutterer.

Aside from the hereditary and physical conditions involved, the victim suffers from a conflict of thought and vocal performance. Fully aware of the effect of his spasmodic speech, and being overanxious not to offend or lose his audience, his thoughts become exhilarated and multiplied beyond the ability of his vocal organs to deliver. The resulting frustration serves to magnify the difficulty and thus strengthen the stuttering habit.

In attempting to establish corrective speech habits, my friend insists that the student entertain *but one thought at a time,* expressed at first in very few words, carefully arranged mentally, then spoken slowly. By removing the conflict of two thoughts fighting for expression, the static and staccato disappear, and normal speech is restored with confidence. Such, at least, is the considered opinion of my teacher-friend, and for my purpose the story makes sense.

"One thing at a time" is probably sane advice for most of the activity in which humans engage. It is certainly a good rule for the foundry sandman. For instance, at repeated instances he is told that his sand is behaving badly. Perhaps the molder is complaining that he can't "get a lift," arguing that the sand is too weak, dry, or brittle. The muller man proceeds to silence this complaint by increasing the bentonite and water. Then another section of the shop is heard from—the mix is too strong and wet!

One molder wants increased flowability and low deformation, another demands quite the opposite. If the castings are shiny, the muller man gets hell for using too much seacoal.



CUTS HANDLING COSTS WITH TWO SPEEDS

Wherever the two-speed Series "700" 'Load Lifter' Electric Hoist handles foundry work, economy gets a lift. The slow, creeping speed — 1/3 that of *high* — doesn't vary with the load. Molds are set or parted, patterns are drawn, flasks are closed — many other delicate lifting jobs are done accurately, smoothly and safely on *low* speed. For lifting loads fast and efficiently, without jerky starts, high speed also responds to the push of a button.

Put two-speed, effortless lifting into your foundry operations — install the Series "700" 'Load Lifter' Electric Hoist. It's ruggedly built to do a job and stay on the job. Capacities: 1/2-ton and up. Ask your "Shaw-Box" Distributor for full details or write for Bulletin 410.

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ELECTRIC HOISTS

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Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

If they are coming slightly gray with some "burn-on," the cleaning room squawks about rotten sand. If a casting cracks, hot strength is too high, and we must cut out the western bentonite-fireclay combination, and substitute good old collapsible "southern," with perhaps a little more wood flour added. In some green-sand molding this will result in a brittle condition which pleases nobody, and in dry-sand the surface of the mold becomes waterproofed to the point where it repels blacking. When excessive amounts of wood flour (especially soft-wood flour) are introduced to increase the collapsibility of a dry-sand mold or core, you again create the waterproofing effect.

Let me say at this point that I anticipate the arguments of many of my best friends who will hotly dispute some of the foregoing statements, and I am quite ready to admit that with their sands, methods, and materials, the waterproofing condition I describe may not exist. But with my sand and with my practice the circumstances are precisely as stated.

Now to get back to this proposition of one thing at a time. I contend that a sandman should attempt to solve his problems singly; and to do this he requires the sympathetic co-operation of all persons concerned with the problem. Whether he realizes it or not, your sand mixer should be engaged in a never-ending research program, paralleling his daily production of special and system sand mixes. He should learn as much as he is mentally capable of learning regarding every material he uses, the methods of such use, and the machinery which measures, blends and aerates to produce the desired results.

As he reads, studies, and (cautiously) experiments, he may be agreeably surprised to detect an expansive growth of his mental capabilities. When Emerson or Shaw (I've forgotten which) said, "Happy is the man who loves his work," he probably wasn't thinking of a sand mixer, but when the axiom is so applied it loses none of its force.

There is a regrettable tendency in many shops to regard the man at the muller as a type of moron who is only capable of tossing so many shovelfuls of sand into a skiphoist, adding ingredients according to the card on the wall, and then is not held responsible for the result. Someone higher up whose word is law, but whose attention is being constantly diverted to other problems,

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A complete range of sizes, standard or made-to-order.

CHILLED CAST IRON SHOT & GRIT

For tough cleaning jobs or surface finishing of heat-treated parts.

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Best for impact type cleaning machines.

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CUT STEEL WIRE SHOT (Hard Drawn Cut Steel Wire)

Extensively used in peening springs and other metal parts.

Catalog No. AB-53 will give you further details on these stocked items, as well as those manufactured as ordered.

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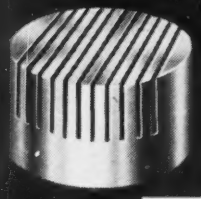
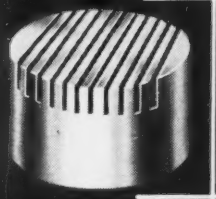
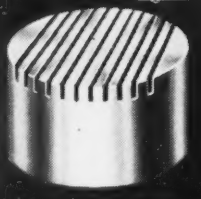


SLOTTED

X-TRA DEEP HEAD .156
Wide Slots .014



DEEP HEAD .093
Wide or Narrow Slots
.014 .010



SHALLOW HEAD .031
Wide or Narrow Slots
.014 .010

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has prescribed the sand mixes which so greatly determine the casting quality.

An efficient foundry foreman or superintendent cannot possibly devote the time and attention necessary to the ever-changing sand problems in even a moderate sized jobbing shop. If the melter and bookkeeper are specialists to be trusted, then your muller - man - sand - technician should be made equally responsible. He or they should be duly consulted so that the sand requirements of a job may be clearly recognized before that job goes into production.

With available records of previous experience, it should not be difficult to decide upon a reasonably satisfactory basic mix. This, of course, may have to be modified to meet requirements that could not be foreseen. Internal ribs or angles may impose stress which demands an unusual mix of mold facing, or even of backing sand. But the most pressing problem of all is the "old sand" returning to the muller from all points of the shop with a variety of retained properties.

It is, of course, good practice to make periodical, cross section tests of this so-called spent material, and thus strike something resembling an average deduction, but you still have only a guided guess. If daily tests were taken of a screened sample from each molding floor, with a record kept of the weight and type of castings poured, your man at the muller would be in a much better position for closer guesswork. To carry this a step further, he should know how much of each sand was being returned, and if possible have it screened and blended before it reaches the muller. Well, we can dream, can't we?

Booklet Covers Dermatoses

A new booklet published by the Association of American Soap & Glycerine Producers Inc. describes, in practical terms, occupational skin diseases and their prevention. It was written by Dr. Louis Schwartz, former medical director, U. S. Public Health Service. At a recent meeting he pointed out that industrial dermatoses account for 75.3 per cent of all occupational diseases. The cost of lost time, compensation and medical payments totals more than $100 million annually for all industry.

The booklet, "Prevention of Occupational Skin Diseases," is available from the association, 295 Madison Ave., New York 17.

"NUISANCE" JOBS SOLVED!

No wonder they call it . . .

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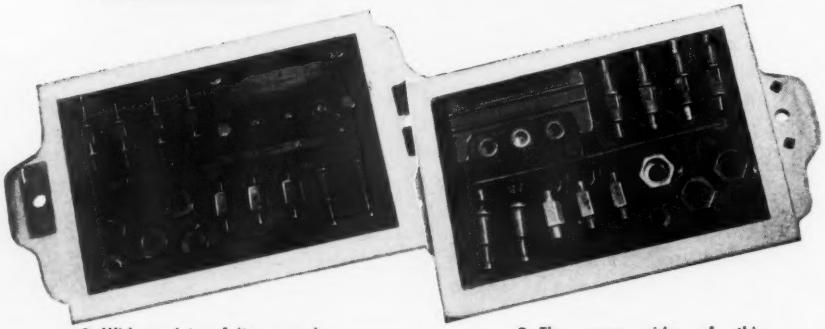

● Wide variety of items made into combination match plate with metal patterns mounted in drag side.

● The cope side of this "nuisance" job is made entirely of SUPER TAMASTONE.

How SUPER TAMASTONE solved a "nuisance" job!

From single loose wooden patterns furnished by customer, white metal ones were made in multiples to balance out a short combination run. By converting these loose pattern odds and ends into a SUPER TAMASTONE Match Plate, the customer received work in record time at a big savings! The foundry was happy, too, another "nuisance" job out of the way, and profitably!

Super Tamastone will work wonders in your foundry too! Write!

TAMMS INDUSTRIES, INC., 228 N. La Salle St., Chicago 1, Ill.

TRADE . . Publications

For More Details Use Reply Card—Page 247

VACUUM MELTED METALS: Carboloy Dept., General Electric Co., P.O. Box 237, R.P.A., Detroit 32, Mich.—Bulletin VM-101 offers general information and technical data on two vacuum melted high-temperature alloys. Publication covers the effects of vacuum melting on properties of various metallic materials, benefits of the process to the user of such metals and fabricating and machining recommendations.
For More Details Circle No. 141—Page 247

PLASTIC FABRICATIONS: Atlas Mineral Products Co., Mertztown, Pa.—Bulletin outlines use of Type I polyvinyl chloride in the fabrication of exhaust systems, process equipment and processing tanks. A section on plastic pipe and fittings includes descriptions and tables on chemical and physical properties of Types I and II polyvinyl and styrene copolymer rubber resin blend plastic pipe.
For More Details Circle No. 142—Page 247

X-RAY UNIT: Jarrell-Ash Co., 26 Farwell St., Newtonville, Mass.—Catalog illustrates and describes a microfocus x-ray unit made in England but available in this country. Catalog notes the instrument has wide application in both diffraction and microradiography techniques and features low exposure time, high resolution and provision for use of special crystallographic procedures.
For More Details Circle No. 143—Page 247

FLOW METERS: Hays Corp., Michigan City, Ind.—Photographs, schematic drawings, construction details, operational and engineering data on electronic flow meters for measurement of differential pressures, liquid level, fluid, gas, air or steam flow, temperatures and pressures are found in publication 55-1074-222.
For More Details Circle No. 144—Page 247

ELECTRIC TOOLS: Porter-Cable Machine Co., 58 Exchange St., Syracuse 8, N. Y.—Electric tool catalog describes 52 portable electric tools and kits with over 400 accessories for electricians, carpenters, plumbers, maintenance men, repair men or specialty trade workers.
For More Details Circle No. 145—Page 247

PALLETIZING MATERIALS: J. H. France Refractories Co., Snow Shoe, Pa.—Service bulletin illustrates palletizing of company's refractory castables, firebrick and mortars.
For More Details Circle No. 146—Page 247

SOURCE UNIT: Baird Associates Inc., 33 University Rd., Cambridge 38, Mass.—Bulletin 35A contains detailed information on the three circuits available in company's spectrographic source unit which enable the spectroscopist to select optimum conditions for a wide range of analytical problems. Specifications and features of the circuits, with schematic diagrams of each, are presented.
For More Details Circle No. 147—Page 247

PHOTOELECTRIC CONTROLS: Electronics Corp. of America, 77 Broadway, Cambridge 42, Mass.—"Proved Answers to Successful Automation" contains specifications, descriptive data and operational charts of photoelectric controls for numerous industrial uses, including high-speed counting, inspection and sorting, smoke control, high-temperature measurement and control, machinery safeguards and conveyor control.
For More Details Circle No. 148—Page 247

HEAT TREATING: Surface Combustion Corp., Toledo 1, O.—*Heat Treat Review*, Volume 6, No. 1 contains articles of interest to foundrymen. "Efficient Fixturing" presents examples of fixtures and trays for increase of furnace versatility and

25-lb. plating work carrier cast in high-conductivity beryllium copper and used in plating equipment made by The Udylite Corporation.

WHEN PARTS ARE CAST FOR A TOUGH ROLE THEY'RE MADE OF BERYLCO® BERYLLIUM COPPER

The increased amperage called for in modern plating equipment demands higher conductivity in this casting—a contact which rides on a copper bus bar and transmits current from the bar to the plating tanks. Various materials used in the past, although they had the required wear resistance, lacked the conductivity for this application.

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economy. "Complete Heat Treat Plants with Standard Equipment" presents cost-saving applications of modern furnaces.
For More Details Circle No. 149—Page 247

PORTABLE POTENTIOMETER: Barber-Colman Co., Wheelco Instruments Division, Rockford, Ill.—Features, specifications and ranges of portable potentiometer are described in bulletin F 5760-1.
For More Details Circle No. 150—Page 247

PROCESSED MINERALS: Shieldalloy Corp., 99 Park Ave., New York 16, N. Y.—Booklet outlines operations and products made at the company's Newfield, N. J. plant. Company produces chromium metal and a range of master and powdered ferro alloys.
For More Details Circle No. 151—Page 247

SPRUE CUTTER: Rice Pump & Machine Co., Belgium, Wis.—Descriptions, specifications and features of two sprue cutters for nonferrous castings are found in bulletin.
For More Details Circle No. 152—Page 247

CASTING SEALER: Prenco Products Inc., 507 East 10 Mile Rd., Hazel Park, Mich.—Data sheet No. 1 describes a sealant and its application in casting impregnation of all types of castings which must withstand air, gas, oil or other fluid pressures.
For More Details Circle No. 153—Page 247

HEARING GUIDE: Employers Mutuals of Wausau, Wausau, Wis.—"Guide for Industrial Audiometric Technicians" is designed as a teaching aid and source of information to enable the industrial audiometric technician, under the supervision of an otologist, to administer expert hearing measurement techniques.
For More Details Circle No. 154—Page 247

DUST COLLECTION: National Dust Collector Corp., Machinery Hall Bldg., Chicago 6, Ill.—Bulletin 55 offers specifications and descriptive details of dust collection system that

uses the filtering principle to trap dust by impingement on glass spheres. Separating efficiencies, application data, description of models and capacity ranges are included.
For More Details Circle No. 155—Page 247

GAGE BLOCKS: Ellstrom Standards Division, Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.—Illustrated catalog contains specifications and prices of line of chromium plated gage blocks, standard individual blocks and tungsten carbide wear blocks.
For More Details Circle No. 156—Page 247

CONVEYOR BELTS: B. F. Goodrich Co., Industrial Products Division, Akron, O.—Data sheet 2255 details special conveyor belt constructions for specific applications. Wire inserted belts, turnable belts, belts with stepped plies, reinforced covers and flanges are covered.
For More Details Circle No. 157—Page 247

METAL GRATING: Klemp Metal Grating Corp., 6605 South Melvina Ave., Chicago 38, Ill.—Data and specification manual covers all types of grating, open-steel floor armor, stair treads, vessel liners, bridge decking and drain gates.
For More Details Circle No. 158—Page 247

COUPLING: Snap-Tite Inc., Union City, Pa.—Dimensions, cut away drawing, construction features and description of uses of quick-connect disconnect coupling is contained in bulletin 230.
For More Details Circle No. 159—Page 247

CLEANING EQUIPMENT: Acoustica Associates Inc., Shore Rd., Glenwood Landing, Long Island, N. Y.—

Chicago Rubber Company's amazing new R54 contact wheel cuts better—faster—longer and will substantially reduce your grinding and polishing costs 3 ways.

This precision machined and accurately balanced wheel is easily and quickly knocked down and reassembled for tire replacement or change.

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- And as usual Chicago Rubber Company's R54 contact wheel allows you to get the most wear from your abrasive belt—more than you ever got before.

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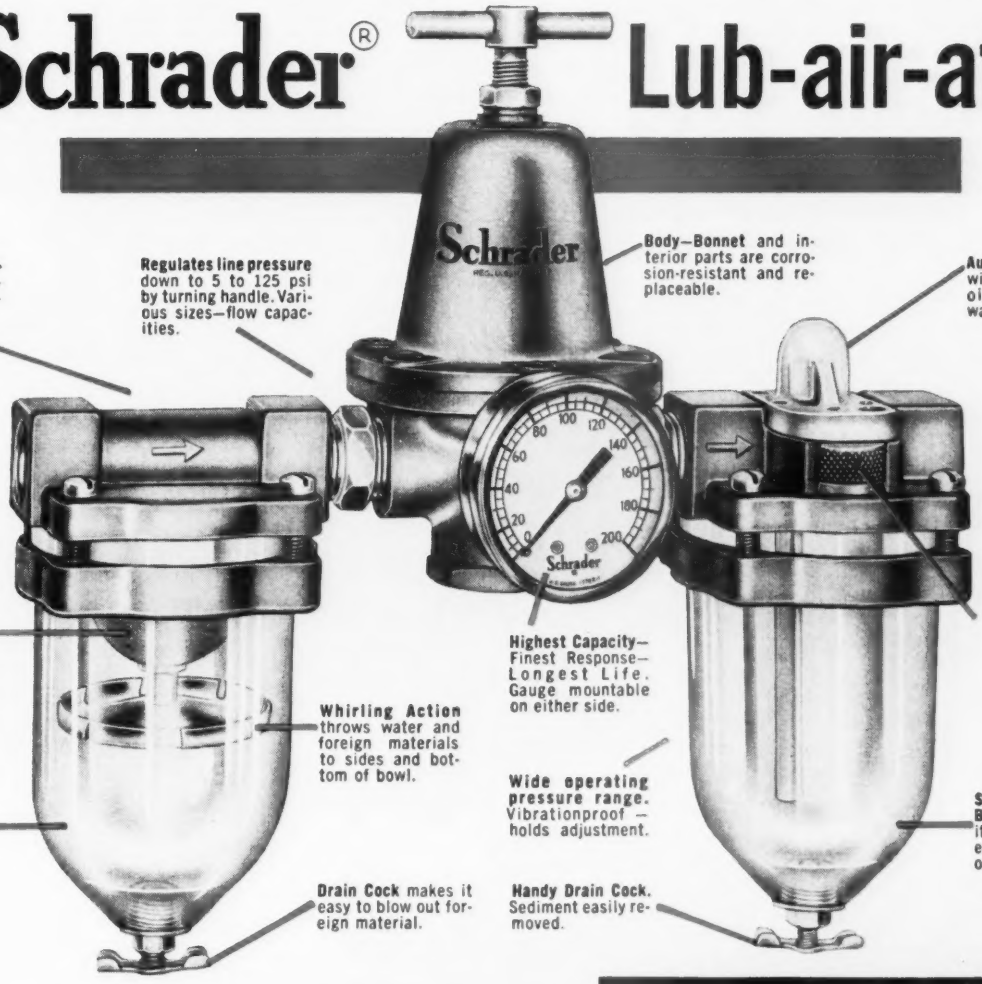
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Cleaning equipment for production cleaning and degreasing of precision products, degassing molten aluminum, metal cutting and other metalworking applications is described in bulletin DR-400.
For More Details Circle No. 160—Page 247

VACUUM PUMPS: Naresco Equipment Corp., 160 Charlemont St., Newton Highlands 61, Mass.—Bulletin P-3 supplies up-to-date data on line of mechanical high vacuum pumps said to be able to handle water and other condensable vapors without loss of original high pumping speed. Nomographs and other information of use in designing a vacuum system also is included.
For More Details Circle No. 161—Page 247

FINE MESH SCREEN: Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.—Features, descriptions, types and sizes of heavy-duty, fine-mesh vibrating screens are offered in bulletin 16-EH.
For More Details Circle No. 162—Page 247

ELECTRODE SELECTOR GUIDE: Alloy Rods Co., Dept. 31, Lincoln Highway West, York, Pa.—Bulletin AR-10 gives designations and applications for 22 stainless steel electrodes. Brief description of each type with general use information and particular welding characteristics are included.
For More Details Circle No. 163—Page 247

SPEED CHANGERS: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee, Wis.—Operating advantages of speed changers are described in bulletin 20B6013D. Arrangement diagrams, selected table showing recommended sizes for standard motors and a speed range table also are included.
For More Details Circle No. 164—Page 247

DISPERSIONS: Acheson Colloids Co., Division of Acheson Industries Inc., Port Huron, Mich.—Booklet lists 44 colloidal and semi-colloidal dispersions for the foundry, metalworking and related industries. Carriers and diluents are given for each product along with typical applications and physical data.
For More Details Circle No. 165—Page 247

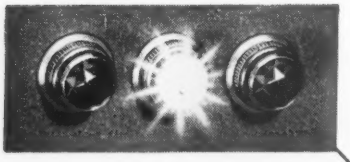
HEAT TREATING: Lindberg Engineering Co., 2440 West Hubbard St., Chicago 12, Ill.—"How to Plan Your Toolroom Heat Treating Department" describes how to select furnaces of proper size, shows recommended layouts, gives approximate floor space requirements and lists auxiliary equipment to assist those planning new, enlarged or redesigned heat treating departments.

For More Details Circle No. 166—Page 247

AIR-COOLED COMPRESSOR: Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.—Compressor equipped with channel valve that may be either direct-connected or belt-driven is described in Form 1540. Cutaway views and a table of specifications are included.
For More Details Circle No. 167—Page 247

PRODUCTION FACILITIES: New Process Gear Corp., 500 Plum St., Syracuse, N. Y.—Booklet details facilities for precision metalworking production. Equipment in the firm's six plants is listed with illustrations of various engineering services available for those who require contract production of close tolerance components or complete units.
For More Details Circle No. 168—Page 247

CONVEYORS: Prab Conveyors Inc., 19815 East Nine Mile Rd., St. Clair Shores, Mich.—Engineering data, specifications, typical layouts, applications and capacity charts of company's four patented conveyors



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3 colored lights *immediately* tell you:

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Ideal for automation.

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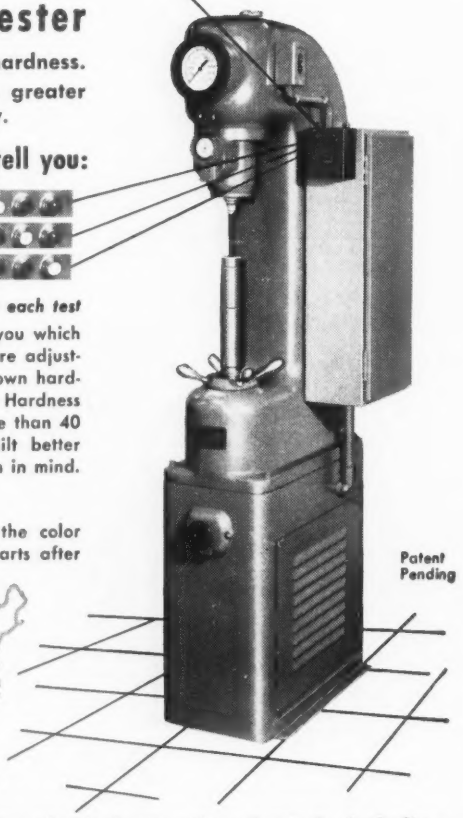

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as well as its custom built equipment are featured in catalog 400.
For More Details Circle No. 169—Page 247

FLOOR CLEANER: Handling Devices Co., 43 Pearle St., Brookline 46, Mass.—Features, advantages, comparison with other methods, and complete specifications of method for suction cleaning dust, dirt, lint, trash, and paper from large floor areas is included in bulletin 551.
For More Details Circle No. 170—Page 247

PRESSURE CONTROLS: Combustion Control Division, Electronics Corp. of America, 718 Beacon St., Boston 15, Mass.—Illustrations, schematic diagrams, specifications, dimensions and electrical ratings of pressure controls for industrial uses are contained in bulletin C-30.
For More Details Circle No. 171—Page 247

MELTING FURNACE: Ajax Engineering Corp., Trenton 7, N. J.—Pamphlet R-43 gives technical data and specifications of a 100 kw twin-coil low frequency induction melting furnace for aluminum, copper, zinc and their alloys.
For More Details Circle No. 172—Page 247

PERMANENT MOLD METHOD: Wagner Permanent Mold Co., 2910 Empire Ave., Burbank, Calif.—Brochure points out advantages inherent in specialized permanent mold process for producing castings.
For More Details Circle No. 173—Page 247

FIRE PROTECTION: American LaFrance Corp., Elmira, N. Y.—Illustrated booklet contains engineering data on airfoam fixed fire protection systems, portable and semi-portable equipment.
For More Details Circle No. 174—Page 247

FOUNDRY reprints

Spinning Cylinder Sleeves at Perfect Circle, by Kenneth L. Mountain, details techniques used in centrifugally casting cylinder sleeves at the Richmond, Ind., plant of Perfect Circle Corp. New technique was developed while searching for a less expensive method to produce better piston rings.
For a Free Copy Circle No. 175—Page 247

Molding Sand Symposium is a 38-page reprint of nine articles published in the November 1954 issue discussing molding sand practice in ferrous and nonferrous foundries. A limited number of these reprints are available and will be supplied on a first-come, first-served basis.
For a Free Copy Circle No. 176—Page 247

Grain Refinement in Magnesium Castings by Robert T. Wood discusses the methods used in a series of experiments showing that hexachlorobenzene imparts improved metal properties and lower operating costs when used as a grain refining agent for magnesium.
For a Free Copy Circle No. 177—Page 247

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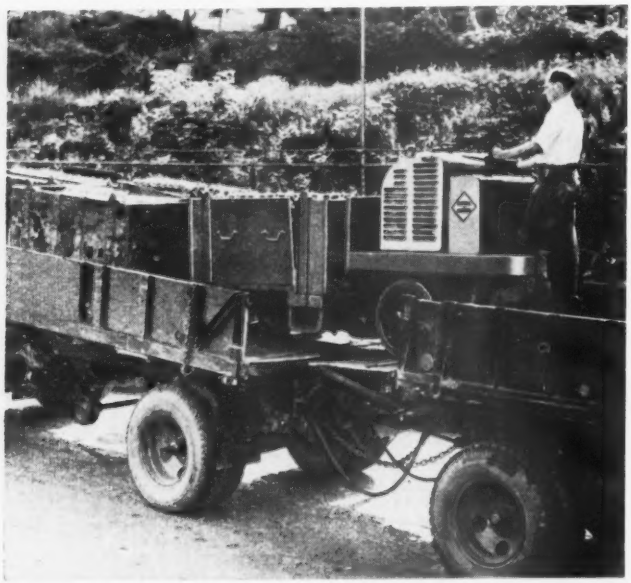
The Shakeout

Industrial Trucks Cut Handling Costs

MECHANIZED HANDLING of incoming castings has enabled an automotive manufacturer to cut transportation costs 50 per cent and handle loads eight times faster. Castings formerly were dumped into railroad cars at the



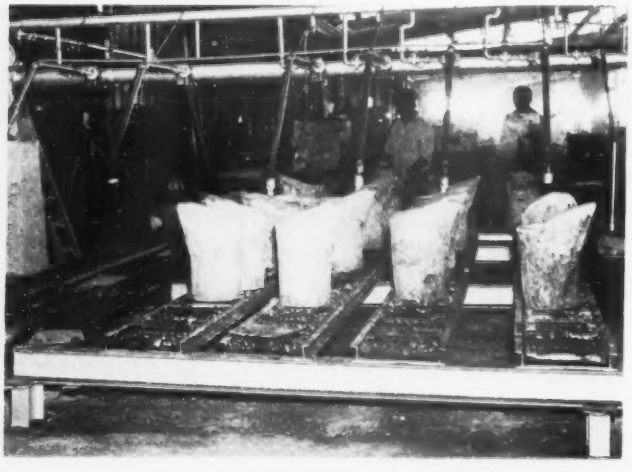
foundry and upon arrival at the engine assembly plant had to be sorted, counted and manually loaded into push-carts for movement to storage. Transportation costs were high, manual methods slow and faulty inventory records a problem. To solve these difficulties, a fleet of Elwell-Parker fork and platform trucks was purchased.

Now each class of castings is placed in special skid boxes at the foundry and delivered by road truck to the assembly plant. There a low lift truck enters the road vehicle and transfers skids to the receiving dock. A high lift vehicle then either double stacks the skids in storage or moves them to the production line. Fork trucks also are used to handle either skids or pallets.

For More Details Circle No. 204—Page 247

Installs Ladle Heating Equipment

LADLE HEATING at Muncie Malleable Foundry Co., Muncie, Ind., is accomplished by mixing, blowing and burning equipment at a conveyorized heating station. Various sizes of ladles are relined and cracks in refractory lining filled and smoothed over. Ladles then are moved on roller conveyors to the heating station.



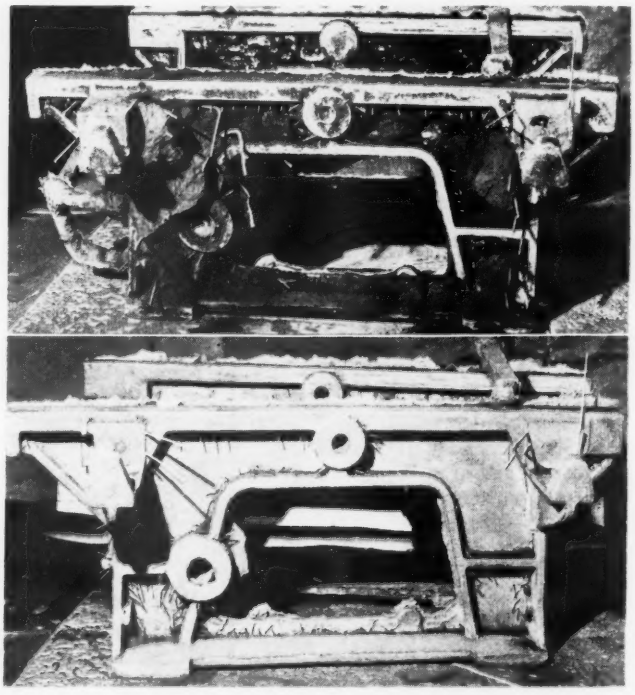
A blower supplies combustion air to mixers, which proportion the air and gas for combustion. Mixture thus formed is ignited and burned through special nozzles. Each mixer is manually controlled and acts independently of the other, so that different size ladles may be dried or heated at same time.

After ladle linings are uniformly heated to the pouring temperature of the metal, they are moved to the end of the conveyor to be picked up by crane or two-wheeled pouring cart. System is said to reduce drying time, save fuel and reduce thermal shock as ladle and metal temperature are about equal. The burner equipment—mixers, nozzles and blower—are made by the Maxon Premix Burner Co., Muncie, Ind.

For More Details Circle No. 205—Page 247

Shot Imparts Clean Surface Finish

MINERAL SHOT BLAST reportedly imparts an improved casting appearance at a low over-all operating cost at Schneider-Bowman Inc., Philadelphia. The company produces gray iron castings in weights from 1 to 50,000 lb, and uses Mono-Kleen, a nonabsorptive, noncorrosive mineral shot product of Baldwin-Hill Co., Trenton, N. J., to impart a clean, shiny surface to its gray iron. Schneider-Bowman uses conventional blast cleaning



equipment and compressed air at 80 psi in removing scale and core fragments prior to final chipping and cleaning.

While appearance of shipped castings is the primary reason for using the shot, other improvements have been discovered. The shot does not clog air lines or feed worms in blast equipment. Because it is virtually dustless, operator visibility is aided. Also the shot is mechanically stable, and recovery and reclamation rates are high.

For More Details Circle No. 206—Page 247

Corebaking Unit Reduces Costs

DIELECTRIC CORE OVEN in use at Peerless Aluminum Foundry, Bridgeport, Conn., is said to have enabled the company to cut core costs while maintaining the high quality of its aluminum castings. Use of electronic bak-

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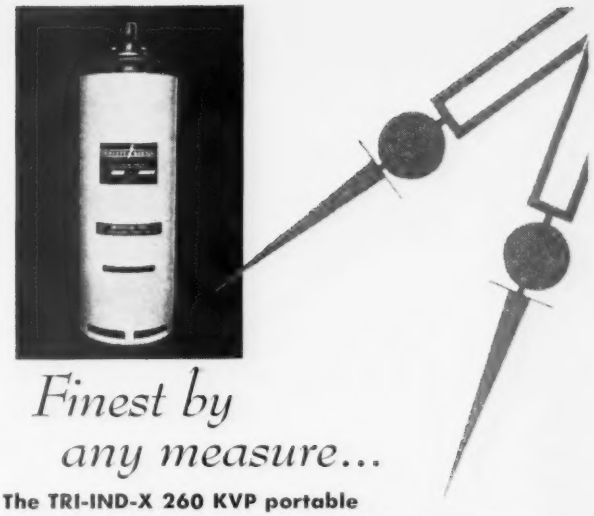

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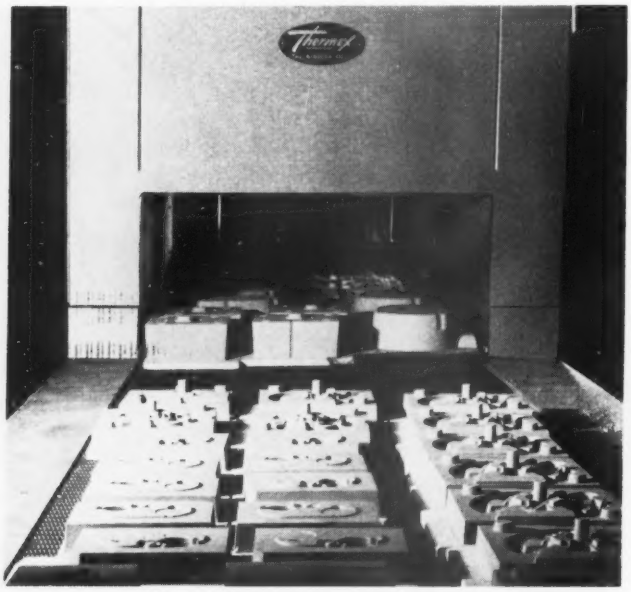
ing, according to company officials, offers these advantages: Low number of manhours and utility costs, rapid baking cycle permits quick schedule changes, rel-



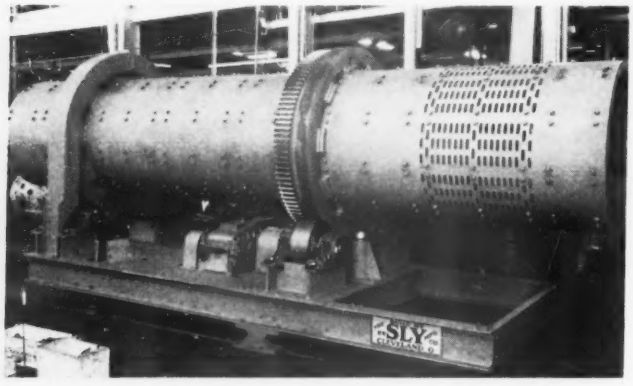
atively few rejected cores, small floor space requirements and drier costs, good core quality, and minimum heat and fumes.

In the accompanying picture, a variety of cores are being fed into a Girdler 30 kw Thermex drier. Cores are dried as they pass under the electrode visible in the center. Cores weighing from a few ounces to over 600 lb can be handled in the same unit. Because heat energy ceases when moisture is expelled, cores cannot overburn. These corebaking units are manufactured by Girdler Co., Division of National Cylinder Gas Co., Louisville, Ky.

For More Details Circle No. 207—Page 247

Mill Cleans 10 Tons Per Hour

A WELL KNOWN Saginaw, Mich., foundry is said to realize efficient cleaning of malleable iron castings and sprues through use of this 48-in.-diam, 21½-ft-long continuous tumbling mill made by the W. W. Sly Mfg. Co., Cleveland. Mill cleans parts at the rate of 10 tons per hour. Sprues and castings are fed into the mill by conveyor, tumbled as they travel through and eventually are discharged at opposite end. Tumbling action is assured



by a specially-designed, manganese steel interior.

Tumbling time is 19 minutes when the mill is loaded at one-fifth capacity (54 cu ft). Shakeout and cleaning are one continuous operation. Red hot castings move directly to the mill and are tumbled clean. Fins are removed in the process, saving time on subsequent cleaning. In the view here the safety guard has been removed to show the drive unit.

For More Details Circle No. 208—Page 247

Cap Screws Hold Molds Tightly

GIANT SOCKET HEAD CAP SCREWS hold molds tightly to back plate in centrifugal casting machines at Lebanon Steel Foundry, Lebanon, Pa. When using carbon steel, hexagon head bolts, a problem developed in stripping threads if bolt was tightened too much; molten metal would seep between mold and back plate if tightened too little. Replacement of carbon steel bolts with giant cap screws made by Standard Pressed Steel Co., Jenkintown, Pa., enabled fasteners to be tightened to 1500 ft lb to give a liquid-tight fit which will not cause any damage to threads.

Cap screws, 1½ in. diam x 7 in. long, are upset from forged, heat-treated alloy steel and have a rated tensile strength of 225,000 lb per cap screw. Standard's line of giant cap screws has been standardized in diameters of 1¼ and 1½ in., NC thread, in lengths up to 12 in. It also manufactures these screws in 1⅛, 1⅜, 2, 2¼, 2½, 2¾ and 3 in. diameters, up to 36 in. long.

For More Details Circle No. 209—Page 247

Stacking Baskets Cut Heat Treating Costs

USING INCONEL BASKETS to stack castings, Ductile Iron Foundry, Stratford, Conn., has cut heat treating time by over 50 per cent and lowered labor costs by 66

per cent. These baskets have averaged over 14 hours of use per day for over 9 months without repair, replacement or downtime. They are manufactured by Wiretex Mfg. Co., Bridgeport, Conn. Baskets are brought up to 1700° F for 3 hr per cycle, then cooled to 1275°F for the remaining heat treating cycle.

Construction is of Inconel with a solid wall and a screen-covered grate bottom through which heat is forced; two outside trunnions permit handling by a crane. A carrier is designed to hold four baskets at a time, each of which accommodates 300 lb of castings. Baskets measure 33¼ in. in diam by 12 in. deep. Bottoms are constructed of cast grids.

For More Details Circle No. 210—Page 247

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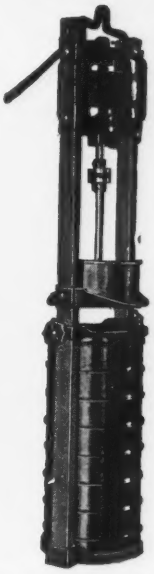

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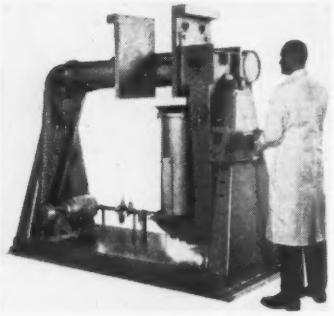

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For LARGE SHELL CORE BLOWING, Shalco's mechanized Model MCM-6 shell core blower is also available for semi-automatic or fully automatic operation. Needs no driers or ovens of any sort. Produces finished cores, completely cured and ready for setting. Larger than the world-famous Shalco Model MC-5*

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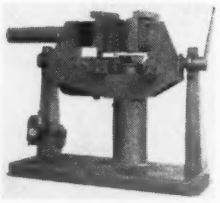

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For SMALL JOB SHOP SHELL CORE BLOWING, Shalco's bench model MC-3 shell core blower offers immediate savings in labor, materials and equipment. Turns out completely cured cores, without driers or ovens of any sort. Uses existing core boxes in most cases. Operated manually by an unskilled worker. The MC-3 is the lowest-priced shell core blower.

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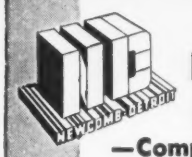

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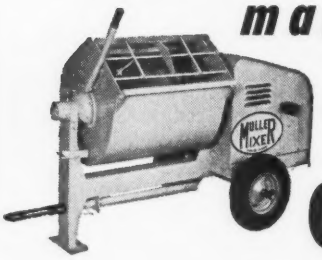

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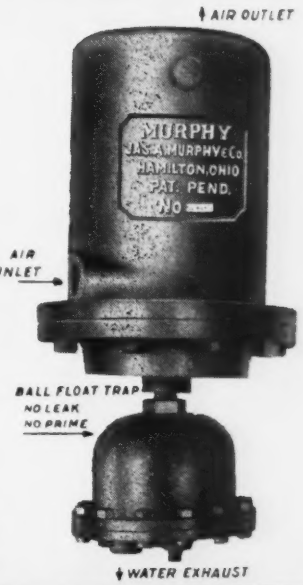

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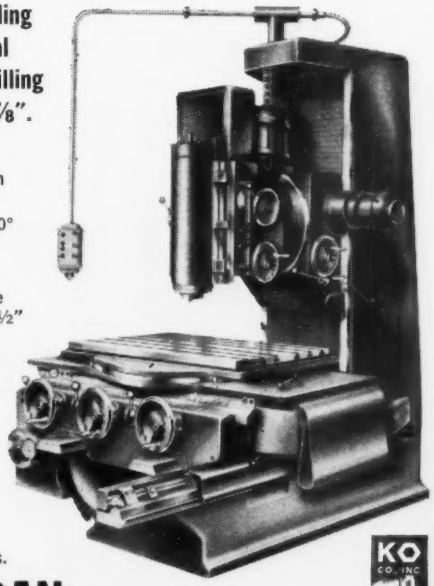

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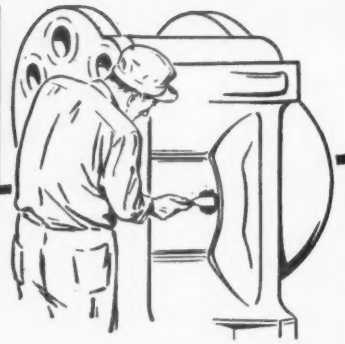

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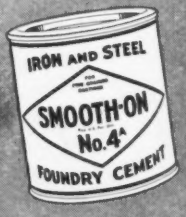

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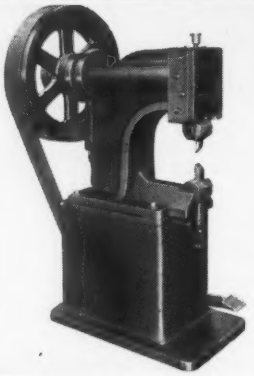

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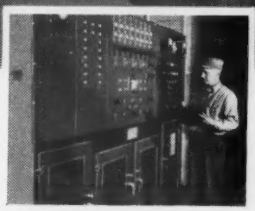

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That's the success story of one Richardson foundry application.

PROBLEM:

To provide a system of control for the batching of sand and core-binder in the production of steel castings; to coordinate batching machinery with the timed discharge of the automatic scales; to provide infallible electric and mechanical checks to assure immediate stoppage of cycle when any phase of operation is incorrect.

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In such a formulating system, using the Richardson equipment specified, G-E engineers in the Everett, Mass., Foundry were able to achieve the outstanding results mentioned above. Sand formulation is now a strictly controlled operation approaching full automation not only in function but in quality control as well. A single operator at a panel board can remotely initiate, sustain, change, or interrupt batch formulation merely by adjusting electric controls. Major advantages of a Richardson system—in addition to increased capacity, labor savings, and quality control—are greater flexiblity, material savings, decreased waste, and easier maintenance.

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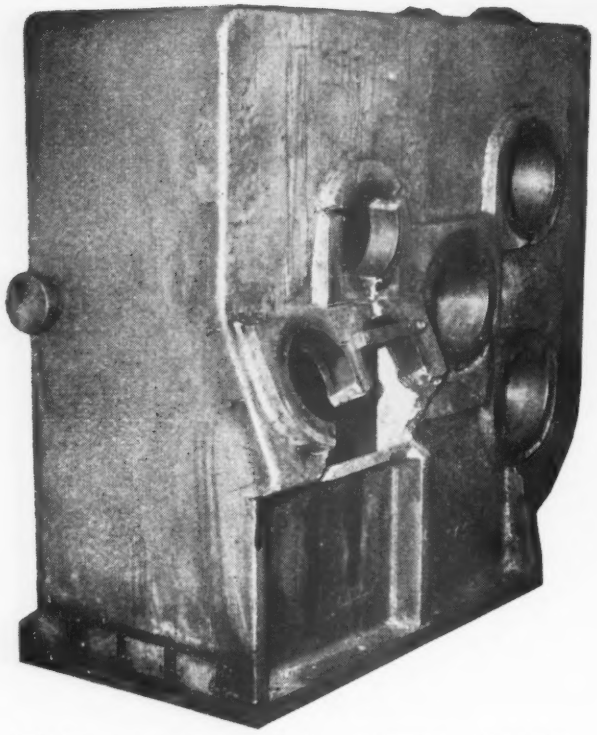
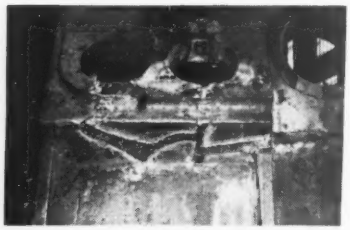
MATERIALS HANDLING BY WEIGHT SINCE 1902

1701



Big break in gear case started small. First a tooth broke — lodged between the gears. The resultant force shattered this 5-ton grey iron casting. Breaks measured 3 to 4 inches in cross section. A new casting would have taken two months to deliver. With NI-ROD "55" a welder saved this one — in 24 hours!



Look closely at the completed welds. Looks count! Just 60 lbs. of NI-ROD "55" saved this casting. The welder used successive passes without preheat, and peened each bead. After welding, excess metal was ground from the bearing surface.

Don't scrap that casting!

Does this repair of a heavy cast iron gear case suggest how you can repair or salvage broken castings?

Many foundries find easy-to-handle NI-ROD "55"* electrodes offer a practical way to repair defects in heavy sections of castings. *Welds match the color of the parent cast iron closely.* 9 out of 10 times no preheat or postheat is needed.

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*Registered Trademark

The INTERNATIONAL NICKEL COMPANY, Inc.
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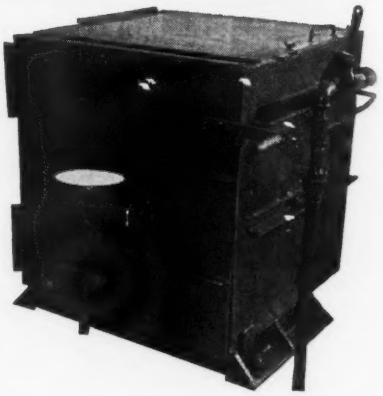
AUTOMOBILE CYLINDER LINERS

DIESEL ENGINE LINERS

BRONZE BUSHINGS

on the new
WATER-COOLED
Model M-WC
(Illustrated)



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Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N.Y.
Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

CONVERTER BLOWERS—See BLOWERS

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Richardson Scale Co., 668 Van Houten Ave., Clifton, N. J.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.

CONVEYORS (Chain)

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Richards-Wilcox Mfg. Co., 174 Third St., Aurora, Ill.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Fabric, Rubber Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Imperial Belting Co., 1800 S. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity Roller)

Alvey-Ferguson Co., 75 Disney St., Cincinnati 9, Ohio.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.
Webster Mfg. Co., Tiffin, Ohio.
Westover Engineers, 3110 W. Fond Du Lac Ave., Milwaukee 10, Wis.

CONVEYORS (Live Roller)

Alvey-Ferguson Co., 75 Disney St., Cincinnati 9, Ohio.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Robinson Air Activated Conveyor Systems, 80 Fifth Ave., New York, N. Y.
Stearns Magnetic Inc., 635 South 28th St., Milwaukee 46, Wis.

CONVEYORS (Metal Belt)

May-Fran Engineering, Inc., 1710 Clarkstone Road, Cleveland 12, Ohio.

CONVEYORS (Mold)

Bartlet & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.

CONVEYORS (Overhead Monorail)

Alvey-Ferguson Co., 75 Disney St., Cincinnati 9, O.
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Grindle Corp., Harvey, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works Inc., Reading, Pa.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Richards-Wilcox Mfg., 174 Third St., Aurora, Ill.
Whiting Corp., Harvey, Ill.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.
Gerwin Industries, 214 Spring St., Michigan City, Ind.

CONVEYORS (Portable)

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

CONVEYORS (Vibrating, Oscillating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

COPPER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

COPPER SHOT

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

CORE BINDERS

Acme Resin Corp., Forest Park, Ill.
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.
Carver Foundry Products Co., Muscatine, Iowa.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Durez Plastics & Chemicals Co., North Tonawanda, N. Y.
Eastern Clay Products Dept. International Mineral & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.
Goehringer Foundry Supply Co., 919 West Fifth St., Cincinnati 3, O.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Schenectady Resins, P.O. Box 1046, Schenectady, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United Oil Co., Erie, Pa.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE BLOWER BUSHINGS

Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

CORE BLOWING MACHINES

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products Co., Muscatine, Iowa
Wm. Demmler & Bros. Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harrison Machine Co., 272 Station Rd., Box 67, Wesleyville, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

COREBOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.

CORE COLORING

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

CORE CUTOFF & CONING MACHINES

Wadsworth Equipment Co., 2477 Mogadore Rd., Akron, Ohio.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE DRIERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Grindle Corp., 15405 Park Ave., Harvey, Ill.

CORE GRINDERS (Power Operated)

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Sutter Products Co., Dearborn, Mich.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N.Y.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

COREMAKING MACHINES

Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harrison Machine Co., 2725 Station Rd., Box 67, Wesleyville, Pa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Porbeck Mfg. Co., 2600 N. Ninth St., St. Louis 6, Mo.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Sutter Products Co., Dearborn, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.
Wadsworth Equipment Co., 2477 Mogadore Rd., Akron, Ohio.

CORE OILS—See CORE BINDERS

CORE and MOLD OVENS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Michigan Oven Co., 419 Brainard St., Detroit 1, Mich.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis 6, Mo.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N.Y.
Stroman Furnace & Engineering, Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

CORE PASTE

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE PLATES (Steel, Aluminum, Magnesium, Asbestos)

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Champion Division, Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Crescent Brass & Pin Co., 5766 Tramrail Ave., Detroit, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Wheelabrator Corp., Mishawaka, Ind.

CORE SAND—See SAND

CORE SAND MIXERS—See SAND PREPARATION EQUIPMENT

CORE STRIPPERS—See CORE DRAWING MACHINES

CORE TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

CORE TRUCKS—See TRUCKS (Core)

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
Smillie, C. M. & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.

CORE and MOLD WASH

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills, Inc., Asbury, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 200 Bruck St., Columbus, Ohio.
Foundries Materials Co., Coldwater, Mich.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Mullite Refractories, Shelton, Conn.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N.Y.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Titanium Alloy Mfg. Div. National Lead Co., 111 Broadway, New York 6, N. Y.
United Oil Co., Erie, Pa.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE WIRES

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

CORES (Strainer, Ceramic)

Louthan Corp., East Liverpool, Ohio.
Porcelain Products, Inc., Findlay, Ohio.
Universal Clay Products, Sandusky, Ohio.

COUPLINGS (Air, Hydraulic)

Aeroquip Corp., Jackson, Mich.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N.Y.
Cleco Division of Reed Roller Bit Co., Houston, Tex.
C. B. Hunt & Sons Inc., Salem, Ohio.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.

COUPLINGS (Flexible, Shaft)

Ajax Flexible Coupling Co., Westfield, N. Y.
Link Belt Co., 337 North Michigan Ave., Chicago 1, Ill.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater St., Detroit 7, Mich.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Grindle Corp., Harvey, Ill.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail—Electric and Hand)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Grindle Corp., Harvey, Ill.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater St., Detroit 7, Mich.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.

CRANES (Self-Propelled)

Baker-Raulang Company, 1250 West 80th St., Cleveland 2, Ohio.
Modern Equipment Co., Port Washington, Wis.
Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

Ajax Electrothermic Corp., Trenton, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Simplicity Engineering Co., Durand, Mich.

CUPOLAS

The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLAS (Hot Blast Equipment)

The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Modern Equipment Co., Port Washington, Wis.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Comlumbiana Pump Co., Columbiana, Ohio.
Grindle Corp., Harvey, Ill.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

CUPOLA LIGHTERS

The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Hickman-Williams Co., Union Commerce Bldg., Cleveland 14, Ohio.
Whiting Corp., Harvey, Ill.

CUPOLA LININGS—See REFRACTORIES

CUPOLA PATCHING GUNS—See REFRACTORY GUNS

CUTOFF MACHINES (Abrasive)

Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

CUTOFF WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Abrasives Corp., Vars Bldg., Buffalo 2, N. Y.
Macklin Company, Jackson, Mich.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc. Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Abrasive Division, Cleveland Quarries Co., Tiffin, Ohio.

CUTTING OILS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CYLINDERS (Air)

Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

CYLINDERS (Hydraulic)

Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

DARK ROOM ACCESSORIES—See X-RAY FILM and ACCESSORIES

DEGASIFIERS and DEOXIDIZERS

Barium & Chemicals Inc., Willoughby, Ohio.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DESIGN TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

DESULPHURIZERS

Carpenter Brothers Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
Modern Equipment Co., Port Washington, Wis.
Olin Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Process Division Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DOWEL PINS

Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Electric)

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh 8, Pa.

DRILLS (Pneumatic)

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
Gardner-Denver Co., Quincy, Ill.
Schramm Inc., West Chester, Pa.

DRIVES (Gear, Variable Speed)

Link Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.

DRUMS (Magnetic)—See SEPARATORS (Magnetic)

DUMP HOPPERS

Brummeler Steel Products Co., Grand Rapids 7, Mich.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, O.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS

Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.
Tractomotive Corp., Deerfield, Ill.

DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Dust Collector Corp., 600 Machinery Hall Bldg., Chicago 6, Ill.
The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.

Schneible Co., Claude B., 212 Stephenson Bldg., P.O. Box 81, North End Station, Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.
Wheelabrator Corp., Mishawaka, Ind.

DYES AND CHEMICALS

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

ELECTRIC FURNACES (See Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co., Div. Union Carbide & Carbon Co., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS (Bucket)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Edwin S. Carman, 1643 Lee Road, Cleveland 18, Ohio.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Lester B. Knight & Associates, Inc., 549 West Randolph St., Chicago 6, Ill.
Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.
Westover Engineers, 3110 W. Fond du Lac Avenue, Milwaukee 10, Wis.

EXHAUST—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FABRICATORS (Metal)

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Penn Iron Works, Inc., Reading, Pa.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

Asbury Graphite Mills, Inc., Asbury, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Stevens Inc., Frederic B., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

FANS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FASTENERS (Conveyor Belt)

Flexible Steel Lacing Co., 4667 Lexington St., Chicago 44, Illinois.

FEEDERS (Belt)

Bartlett & Snow Co., C. O. 6201 Harvard Ave., Cleveland 5, O.
Link-Belt Company, 307 North Michigan Ave., Chicago, Ill.
Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

FEEDERS (Rotary)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Fuller Company, Catasauqua, Pa.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Vibrating)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Carrier Conveyor Corp. Frankfort Ave., at Clifton, Louisville 6, Ky.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.
Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

FERROBORON

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Cleveland, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Titanium Alloy Mfg. Div. National Lead Co., 111 Broadway, New York 6, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FIRE BRICK, CLAY, SAND, STONE—See REFRACTORIES

FLASK BANDS—See BANDS (Snap Flask)

FLASK BUSHINGS, PINS and FITTINGS

The Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASK FILLERS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

FLASK LIFT MACHINES—See PATTERN DRAW MACHINES

FLASKS (Aluminum, Magnesium)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASKS (Slip)

Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Pressed Steel Div., Republic Steel Corp., 6100 Truscon Ave., Cleveland 27, Ohio.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.

FLOORING (Non-Slip)

Norton Co., Worcester 6, Mass.

FLUXES

Cleveland Flux Co., 1026 Main St. Cleveland 13, Ohio.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FLUXES (Soldering, Welding and Tinning)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FOUNDRY ENGINEERS (See ENGINEERING SERVICE)

FOUNDRY LAYOUT and METHODS (See ENGINEERING SERVICE)

FOUNDRY NAILS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SUPPLY HOUSES

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.

Stevens, Inc., Frederic B., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

FURNACE BLOWERS—See BLOWERS

FURNACE LINING—See REFRACTORIES

FURNACES (Air)

Grindle Corp., 16231 Turner Ave., Harvey, Ill.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES, (Electric Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
American Bridge Co., Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Hevi Duty Electric Co., 4212 Highland Ave., Milwaukee 1, Wis.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired Melting)

Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Reda Pump Co., Bartlesville, Okla.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Heat Treating and Annealing)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
General Electric Co., Schenectady, N. Y.
Hevi Duty Electric Co., 4212 Highland Ave., Milwaukee 1, Wis.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

GAGGERS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5. O.
Wadsworth Equipment Co., 2477 Mogadore Rd., Akron, Ohio.

GAS (Oxygen, Acetylene, Carbon Dioxide, Industrial)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17 N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

GAS BURNERS—See BURNERS

GENERATORS (Acetylene)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

GLOVES—See SAFETY CLOTHING

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Pulmosan Safety Equipment Co., 649 Pacific St., Brooklyn 17, N. Y.
Willson Products Inc., Reading, Pa.

GRAPHITE and GRAPHITE BRIQUETS

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills Inc., Asbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5. O.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

GRINDERS (Flexible Shaft)

Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.

GRINDERS (Pneumatic Portable)

Aro Equipment Corp., Bryan, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Tex.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.

GRINDERS (Surface, Bench, Disc, Floor)

Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh 22, Pa.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Sutter Products Co., Dearborn, Mich.

GRINDING WHEELS

Bay State Abrasive Products Co., Westboro Mass.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Cincinnati Milling Machine Co., Cincinnati 9, Ohio.
Elgin National Watch Co., 107 National Ave., Elgin, Ill.
Mid West Abrasive Co., Owosso, Michigan.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
United States Rubber Co., 4300 New Haven Ave., Fort Wayne 4, Ind.

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Desmond-Stephen Mfg. Co., Urbana, O.
Norton Co., Worcester Mass.

GRINDSTONES—See GRINDING WHEELS

GRIT—See SHOT and GRIT

HAMMERS (Chipping)—See PNEUMATIC TOOLS and CHISELS

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Steel City Testing Machines Inc., 8817 Lyndon, Detroit 21, Mich.

HEAT CONTROL AND RECORDING DEVICES

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
The Grindle Corp., 15405 Park Ave., Harvey, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

HEATERS (Space, Unit, Oven, Water)

American Air Filter Co. Inc., Louisville 8, Ky.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Drying Systems Inc., 1800 W. Foster Ave., Chicago 40, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Thermal Research & Engineering Corp., Conshohocken, Pa.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HELMETS (Blasting)

American Optical Co., Southbridge, Mass.
Pangborn Corp., Hagerstown, Md.
Pulmoson Safety Equipment Co., 649 Pacific St., Brooklyn 17. N. Y.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Wheelabrator Corp., Mishawaka, Ind.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Aro Equipment Corp., Bryan, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

HOISTS (Chain, Hand)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc., Muskegon, Mich.
Modern Equipment Co., Port Washington, Wis.
Wright Hoist Div., American Chain & Cable Co. Inc., York, Pa.

HOISTS (Electric)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Manning, Maxwell & Moore, Inc., Muskegon, Mich.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater St., Detroit 7, Mich.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Wright Hoist Div., American Chain & Cable Co. Inc., York, Pa.

HOISTS (Skip)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Gardner-Denver Co., Quincy, Ill.
Grindle Corp., Harvey, Ill.
Link Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

HOODS (Shakeout, Pouring and Cooling)—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

HOSE (Air, Blasting, Water, Gas)

Aeroqup Corp., Jackson, Mich.
Gardner-Denver Co., Quincy, Ill.
Hewitt Rubber Div., Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HOSE FITTINGS and REELS

Aeroquip Corp., Jackson, Mich.
A. Schrader's Son,
417 Vanderbilt Ave.,
Brooklyn 17, N. Y.

HOT TOP MATERIALS—See RISER COMPOUNDS

HYDRAULIC CLEANING—See BLAST CLEANING EQUIPMENT

IMPREGNATING SYSTEMS and CASTING SEALER

Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.

INGOT MOLDS

Acme Foundry Co.,
Detroit 16, Mich.
Great Lakes Carbon Corp.,
579 Fifth Ave.,
New York 36, N. Y.
National Carbon Co.
Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

INGOTS—(See type of metal)

INOCULANTS

Carborundum Co.,
Perth Amboy, N. J.
United States Graphite Co.,
Saginaw, Mich.

INSPECTION EQUIPMENT

Allis-Chalmers,
Milwaukee 1, Wis.
Andrew King,
Ardmore, Pa.
Dietert, Harry W.,
9330 Roselawn Ave.,
Detroit 4, Mich.
Detroit Testing Machine Co.,
9390 Grinnell Ave.,
Detroit 13, Mich.
Eastman Kodak Co.,
Rochester, N. Y.
Magnaflux Corp.,
7300 West Lawrence Ave.,
Chicago 31, Ill.
Steel City Testing Machines Inc.,
8817 Lyndon,
Detroit 21, Mich.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Pickands, Mather & Co.,
Cleveland 14, O.

IRON OXIDES

Carpenter Brothers, Inc.,
606 West Wisconsin Ave.,
Milwaukee 3, Wis.
Delta Oil Products Co.,
Milwaukee 9, Wis.
Tamms Industries Inc.,
228 No. La Salle St.,
Chicago 1, Ill.
Thiem Products Co.,
9800 West Rogers,
Milwaukee 14, Wis.

JACKETS (Mold)—See MOLD JACKETS

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Great Western Mfg. Co.,
Leavenworth, Kansas.

LABORATORY EQUIPMENT (Physical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Great Western Mfg. Co.,
Leavenworth, Kansas.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Grindle Corp., 16231 Turner Ave., Harvey, Ill.
Industrial Equipment Co.,
Minster, O.
Modern Equipment Co.,
Port Washington, Wis.
Spincraft Inc., 4122 W. State St., Milwaukee 8, Wis.
Federic B. Stevens, Inc.,
Detroit 16, Mich.
Whiting Corp.,
15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS—See REFRACTORIES

LEAD

Federated Metals Div., American Smelting and Refining Co.,
120 Broadway, New York 5.
George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.

LIFT TRUCKS (See Trucks, Power Lift)

LINSEED OIL

Hercules Powder Co.,
Wilmington 99, Del.
United Oil Co., Erie, Pa.

LITHIUM

Lithium Corp. of America,
Rand Tower, Minneapolis, Minn.

LOADERS

Clearfield Machine Co.,
Clearfield, Pa.
Modern Equipment Co.,
Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LOADERS (Front-End)

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.
Clark Industrial Truck Div.
Clark Equipment Co.,
Battle Creek, Mich.
Frank G. Hough Co.,
703 Sunnyside Ave.,
Libertyville, Ill.
Hyster Co.,
2902 N.E. Clackamas St.,
Portland 8, Oregon
Jaeger Machine Co.,
550 West Spring St.,
Columbus 16, Ohio
Tractomotive Corp.
Deerfield, Ill.

LUBRICATING SYSTEMS (Crane)

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

LUBRICANTS (Industrial)

Acheson Colloids Co.,
Port Huron, Mich.
Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.
Smith Oil & Refining Co.,
1102 Kilburn Ave.,
Rockford, Ill.
United Oil Mfg. Co.,
Erie, Pa.
United States Graphite Co.,
Saginaw, Mich.

MACHINE KEYS

Standard Horse Nail Corp.,
New Brighton, Pa.

MAGNESIUM INGOTS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Division of American Smelting and Refining Co.,
120 Broadway, New York 5, N. Y.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co.,
5400 Dunham Rd.,
Maple Heights, Ohio

MAGNETIC PARTICLE TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

MAGNETS

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Jaeger Machine Co.,
Columbus 16, Ohio.
Ohio Electric Mfg. Co.,
5400 Dunham Rd.,
Maple Heights, Ohio.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

MANGANESE (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp.,
30 E. 42nd St.,
New York 17, N. Y.
Ohio Ferro-Alloys Corp.,
Canton 2, Ohio.
Whitehead Metal Products
303 West 10th St.,
New York 6, N. Y.

MATCHPLATE METAL

Federated Metals Division of American Smleting and Refining Co.,
120 Broadway, New York 5, N.Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Acme Aluminum Alloys Inc.,
232 North Findlay St.,
Dayton 3, Ohio.
Champion Div. Pettibone Mulliken Corp.,
2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper,
Detroit 11, Mich.
Hines Flask Co., 3431 W. 140 St., Cleveland 11, Ohio.
Scientific Cast Products Corp.,
1388-92 E. 40 St.,
Cleveland 3, O.

MELTING POTS

Acme Foundry Co.,
Detroit 16, Mich.

METAL CLEANING—See BLAST CLEANING EQUIPMENT

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc.,
418 N. LaSalle St.,
Chicago 10, Ill.

MIXERS (Core Wash)

Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.

MIXERS (Core Wash) SAND PREPARATION EQUIPMENT

MOLD CONVEYORS — See CONVEYORS (Mold)

MOLD DRYERS

Burdett Mfg. Co.,
3433 W. Madison,
Chicago 7, Ill.

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Kirk & Blum Mfg. Co.,
3108 Forrer St.,
Cincinnati 9, Ohio.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis 6, Mo.

MOLD JACKETS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

MOLD OVENS—See CORE and MOLD OVENS

MOLD SEAL COMPOUND

Presstite Engineering Co., 39th & Chouteau, St. Louis, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

MOLD WASH—See CORE and MOLD WASH

MOLDING MACHINES

Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp.,
2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp.,
2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Eastern Clay Products Dept. International Minerals & Chemicals Corp., 20 North Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
LaGrange Park, Ill.
Johnston & Jennings Div.,
Pettibone-Mulliken Corp.,
2424 No. Cicero Ave.,
Chicago 39, Ill.
Milwaukee Foundry Equipment Div.,
Spo Inc., 3328 W. Pierce St.,
Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Shalco Engineering Corp.,
Palo Alto, Calif.
Sutter Products Co.,
Dearborn, Mich.
Tabor Mfg. Co.,
Div. Turbo Machine Co.,
Lansdale, Pa.

MOLDING SANDS—See SAND

MOLYBDENUM and COMPOUNDS

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONORAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Link-Belt Co., 307 N. Michigan Ave., Chicago 11, Ill.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

MULLERS—See SAND PREPARATION EQUIPMENT

NAILS (Chill)

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

NITROGEN—See GAS

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 121 South Division St., Ann Arbor, Mich.
Carborundum Co., Perth Amboy, N. J.
Carpenter Brothers, Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

OIL BURNERS—See BURNERS

OPEN HEARTH DOORS

Wm. M. Bailey Co., Pittsburgh 16, Pa.

OPTICAL PYROMETERS—See PYROMETERS

OVENS (Annealing and Heat Treating)—See FURNACES (Heat Treating and Annealing)

OVENS (Core)—See CORE and MOLD OVENS

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Michigan Oven Co., 419 Brainard, Detroit 1, Mich.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis 6, Mo.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

OVENS (Mold Drying)—See CORE and MOLD OVENS

OXYGEN—See GAS

PARTING COMPOUNDS

Acheson Colloids Co., Port Huron, Mich.
Delta Oil Products Co., Milwaukee 9, Wis.
Dow Corning Corp., Midland, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United Oil Co., Erie, Pa.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PATTERN COATINGS

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.

PATTERN COMPOUND

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN DRAW MACHINES

The Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

PATTERN LUMBER

Rietz Lumber Co., 1814 N. Central Park Ave., Chicago 47, Ill.

PATTERN METAL

Cerro de Pasco Copper Co., 40 Wall St., New York, N. Y.
Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

PATTERN PLATES—See PATTERNS and PATTERN PLATES (Wood, Metal)

PATTERN SHOP EQUIPMENT

Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Kurt Orban Co., 34 Exchange Place, Jersey City 3, N. J.
Oliver Machinery Company, Grand Rapids 2, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERNS and PATTERN PLATES (Wood, Metal)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio
Anderson Pattern Inc., Muskegon Heights, Mich.
Atlas Aluminum Plate Co., 4260 North 126th St., Milwaukee 10, Wis.
Automotive Pattern Co., 1884 John R. Street, Detroit 3, Michigan.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, O.
Pyle Pattern & Mfg. Co., 2636 Sanford St., Muskegon Heights, Mich.
S.P.O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Wellman Bronze & Aluminum Co., 12800 Shaker Blvd., Cleveland 20, Ohio.

PERMANENT MOLDS

Centrifugal Casting Machine Co., Tulsa, Okla.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
Master Pattern Co., 1315 Main Ave., Cleveland, O.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.

PIG CASTING MACHINES

Wm. M. Bailey Co., Pittsburgh 16, Pa.

PIG IRON

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pikands, Mather & Co., Cleveland 14, O.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)—See FLASK BUSHINGS, PINS and FITTINGS

PITCH

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PLUMBAGO—See GRAPHITE and GRAPHITE BRIQUETS

PNEUMATIC TOOLS and CHISELS

Aro Equipment Corp., Bryan, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.
Schramm Inc., West Chester, Pa.

POURING DEVICES

Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Grindle Corp., Harvey, Ill.
Industrial Equipment Co., Minster, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PULLEYS (Magnetic)—See SEPARATORS (Magnetic)

PUMPS

Gardner-Denver Co., Quincy, Ill.

PUMPS (Dry, Vacuum)

Allis-Chalmers Mfg. Co. Milwaukee 1, Wis.
Fuller Company, Catasauqua, Pa.
Kinney Mfg. Div. New York Air Brake Co., 3541 Washington St., Boston 30, Mass.

PUSH-OFF MACHINES—See PATTERN DRAW MACHINES

PUTTY (Foundry)

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Foxboro Company, Foxboro, Mass.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Pyrometer Instrument Co., Bergenfield, N. J.

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

RACKS (Core Ovens)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

RADIOGRAPHY (Industrital)

Eastman Kodak Co., Rochester, N. Y.
Metal & Thermit Corp., 100 East 42nd St., New York, N. Y.

REFRACTORIES (Firebrick, Fire Clay, Fire Sand, Fire Stone)

Ajax Electrothermic Corp., Trenton, N. J.
Babcock & Wilcox Co., 161 42nd St., New York 17, N. Y.
Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15, Ohio.
Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Carpenter Brothers Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Johns-Manville, 22 East 40th St., New York 16, N. Y.
Laclede Christy Div., H. K. Porter Co. Inc., 2000 Hampton Ave., St. Louis 10, Mo.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mexico Refractories Co., Mexico, Mo.
Mullite Refractories, Shelton, Conn.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Titanium Alloy Mfg. Div., National Lead Co., 111 Broadway, New York 6, N. Y.
United States Graphite Co., Saginaw, Mich.
Walsh Refractories, 101 Ferry St., St. Louis 7, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

REFRACTORY GUNS

Air Compressors & Motors, Inc., 3501 Croton Ave., Cleveland 6, Ohio.
Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15, Ohio.
Eastern Clay Products Dept., International Minerals & Chemicals Corp., 20 N. Wacker Drive, Chicago 6, Ill.

RESIN (Shell Mold)

Acme Resin Corp., Forest Park, Ill.
The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.
Catalin Corp. of America, 1 Park Ave., New York 16, N. Y.
Durez Plastics & Chemicals Inc., North Tonawanda, N. Y.
General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.
Plastics Engineering Co., 1607 Geele, Sheboyan, Wis.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Schenectady Resins, P. O. Box 1046, Schenectady, New York.

RESPIRATORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Pulmosan Safety Equipment Co., 649 Pacific St., Brooklyn 17, N. Y.
Willson Products Inc., Reading, Pa.

RIDDLES (Electric)

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Western Mfg. Co., Leavenworth, Kansas.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

RISER COMPOUNDS

Asbury Graphite Mills, Inc., Asbury, N. J.
Barium & Chemicals Inc., Willoughby, Ohio.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
U. S. Graphite Co., Saginaw, Mich.

ROD STRAIGHTENERS—See CORE ROD STRAIGHTENING and CUTTING MACHINERY

ROLLER-HEARTH FURNACES — See FURNACES (Heat Treating and Annealing)

RUBBER LINING MATERIAL (Abrasive Resisting)

Pangborn Corp., Hagerstown, Md.

SAFETY EQUIPMENT

American Optical Co., Southbridge, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Industrial Gloves Co., Danville, Ill.
Pulmosan Safety Equipment Co., 649 Pacific St., Brooklyn 17, N.Y.
Pangborn Corp., Hagerstown, Md.
United States Rubber Co., 4300 New Haven Ave., Ft. Wayne 4, Ind.

SAND (Core, Molding, Blasting)

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Clayton Silica Co., Lafayette Bldg., Waterloo, Iowa.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Lyle T. Manley Co., Rockton, Ill.
Nugent Sand Co., Muskegon, Mich.
Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.
Ottawa Silica Co., Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Glass Sand Corp., 140 Stanwix St., Pittsburgh 22, Pa.
Standard Silica Co., Ottawa, Ill.
Titanium Alloy Mfg. Div., National Lead Co., 111 Broadway, New York 6, N. Y.
Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SAND BLAST BARRELS—See BLAST CLEANING EQUIPMENT

SAND BLAST EQUIPMENT—See BLAST CLEANING EQUIPMENT

SAND BLAST NOZZLES—See NOZZLES (Blasting)

SAND BLAST ROOMS—See BLAST CLEANING EQUIPMENT

SAND BLAST TABLES—See BLAST CLEANING EQUIPMENT

SAND CONTROL and TESTING EQUIPMENT

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Great Western Mfg. Co., Leavenworth, Kans.
Hayico Controls Corp., Neenah, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND DRYERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Cleco Division of Reed Roller Bit Co., Houston, Texas.

Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.
Link-Belt Co., 307 North Michigan Ave., Chicago 5, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Richardson Scale Co., 668 Van Houten Ave., Clifton, N. J.

SAND MIXERS—See SAND PREPARATION EQUIPMENT

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.
Denver Equipment Co., 1400 171st St., Denver 17, Colo.
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.
Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
Moulders Friend, Dallas City, Ill.
Muller Machinery Co., Metuchen 1, N. J.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

States Engineering Corp., 922 W. Berry, Ft. Wayne 2, Ind.
Wheelabrator Corp., Mishawaka, Ind.

SAND RAMMERS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, O.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.

SAND RECLAIMERS

Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.
Denver Equipment Co., 1400 17th St., Denver 17, Colo.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SAND SIFTING and SCREENING MACHINERY—See SAND PREPARATION EQUIPMENT

SAND STORAGE BINS and GATES

American Bridge Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Gerotor May Corp., Maryland Avenue & Oliver, Baltimore, Md.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Marietta Concrete Corp., Marietta, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Neff & Fry Co., Camden, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Webster Mfg. Co., Tiffin, Ohio.

SAW SHARPENING SERVICE

Hinkley Industries, Inc., Post Office Box 1100, Brunswick, Ohio.

SAWS (Band, Metal, Wood)

American Saw & Mfg. Co., Springfield, Mass.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh 8, Pa.
Hinkley Industries, Inc., Post Office Box 1100, Brunswick, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.

SCALING HAMMERS—See PNEUMATIC TOOLS and CHISELS

SCALE CARS

The Grindle Corp., Harvey, Ill.

SCALES

Toledo Scale Co., Toledo 1, Ohio.

SCREENS (Shakeout and Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Div. Pettibone Mulliken Corp. 2424 N. Cicero, Chicago 39, Ill.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

SEA COAL

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.
Jas. A. Murphy & Co., Hamilton, O.
Pangborn Corp., Hagerstown, Md.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.
Wheelabrator Corp., Mishawaka, Ind.

SEPARATORS (Magnetic)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Link-Belt Co., 307 N. Michigan. Ave., Chicago 9, Ill.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHELL MOLDING (Equipment and Accessories)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products, Muscatine, Iowa.
C & S Products Co., 14841 Meyers Rd., Detroit 27, Mich.
Centrifugal Casting Machine Co., Tulsa, Okla.
Harrison Machine Co., 2725 Station Rd., Box 67, Wesleyville, Pa.
Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Shalco Engineering Corp., Palo Alto, Calif.
Shell Process Inc., McKinstry Ave., Chicopee, Mass.
Shell-O-Matic Corp., 26 Avenue L, Newark, N. J.
Sutter Products Co., Dearborn, Mich.

SHELL MOLD SAND (Coated)

Acme Resin Corp., Forest Park, Ill.

SHELL MOLDS—See RESIN

SHOT AND GRIT

Abrasive Shot and Grit Company, Springville, New York.
Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
Baldwin-Hill Co., 500 Breunig Ave., Trenton 2, N. J.
Carborundum Co., Niagara Falls, N. Y.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Steel Shot Producers, Inc., Butler, Pa.
Wheelabrator Corp., Mishawaka, Ind.

SHOT (Peening)—See SHOT and GRIT

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Allen Industrial Products, Inc., P. O. Box 75, Battle Creek, Mich.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

SILICA FLOUR

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.
Ottawa Silica Co., Ottawa, Ill.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Standard Silica Co., Ottawa, Ill.
Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.

SILICOMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America 420 Lexington Ave., New York, N. Y.

SILICON (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON—See PIG IRON (Silvery)

SKIMMERS

Tamms Industries Inc., 228 North LaSalle St., Chicago 1, Ill.

SLINGS (Chain)—See CHAIN

SLINGS (Wire Rope)

Union Wire Rope Co., 21st & Manchester Ave., Kansas City, Mo.

SLIP FLASKS—See FLASKS, slip

SLIP JACKETS—See MOLD JACKETS

SMELTERS and REFINERS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SNAGGING MACHINES—See GRINDERS

SNAGGING WHEELS—See GRINDING WHEELS

SNAP FLASKS—See FLASKS (Snap)

SODA ASH

Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Solvay Process Division, Allied Chemical & Dye Corp. 61 Broadway, New York 6, N. Y.

SOLDER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SPECTROGRAPHIC ANALYSIS

Baird Associates, 33 University Rd., Cambridge 38, Mass.

SPRAY GUNS

Murphy & Co., Jas. A., Hamilton, O.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.
Rice Pump & Machine Co., Belgium, Wis.

STEEL SHOT—See SHOT and GRIT

STEEL (Structural)

American Bridge Co., Div., United States Steel Corp., 52 S. Wm. Penn Place, Pittsburgh 19, Pa.

STRAINER CORES—See CORES (Strainer, Ceramic)

STRIPPING MACHINES—See PATTERN DRAW MACHINES

TANK TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TANKS (Dewatering)

Claude B. Schneible Co., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.

TELLURIUM

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TEMPERATURE CONTROLLERS.

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

TENSILE TESTING MACHINES

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines, Inc., 8817 Lyndon, Detroit 21, Mich.

TESTING EQUIPMENT—See Type of Test

THERMOCOUPLES

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

TONGS

Industrial Equipment Co., Minster, O.

TORCHES and BURNERS (Acetylene, Gas, Oil)

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

TORCHES (Gouging and Cutting)—See WELDING, CUTTING and GOUGING APPARATUS

TOTE BOXES—See BOXES (Stacking, Tote)

TRACTOR—See TRUCKS (Utility and Power Lift)

TRAMRAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

TROLLEYS

Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.
Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.

TRUCK CRANES

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCKS (Core)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Utility and Power Lift)

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.
Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.
Jaeger Machine Co., Columbus 16, Ohio.
Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.
Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Tractomotive Corp., Deerfield, Ill.

TUMBLING BARRELS

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNLOADERS (Car)

Link-Belt Company, 307 North Michigan Ave., Chicago 1, Ill.

VACUUM DEGASSING EQUIPMENT

Centrifugal Casting Machine Co., Tulsa, Okla.

VALVES (Air, Oil, Water, Steam)

Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.
Ross Operating Valve Co., 120 East Golden Gate, Detroit, Michigan.

VALVES (Blow-off and Cut-off)

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.
C. B. Hunt & Sons Inc., Salem, Ohio.
Ross Operating Valve Co., 120 East Golden Gate, Detroit, Michigan.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

VENTILATING — See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

VENTS (Corebox)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler, Wm. & Bros., Kewanee, Ill.
C. M. Smillie & Co., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

VIBRATORS

Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Muliken Corp., 2424 No. Cicero, Chicago 39, Ill
Chicago Pneumatic Tool Co., 6. E. 44th St., New York 17, N. Y.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, 0.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

VISES (Hydraulic, Mechanical, etc.)

Desmond-Stephan Mfg. Co., Urbana, Ohio.

WASHES—See CORE and MOLD WASH

WEDGES (Foundry)

The Adams Co., Dubuque, Iowa.
Hardy Sand Co., P. O. Box 476, Evansville, Indiana.

WELDING APPARATUS (Electric Arc, Inert Gas)

Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

WELDING, CUTTING and GOUGING APPARATUS and SUPPLIES

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

WELDING ELECTRODES (Carbon)

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., Saginaw, Mich.

WELDING GAS—See GAS

WELDING RODS and ELECTRODES

Carborundum Co., Perth Amboy, N. J.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Marquette Mfg. Co., 307 East Hennepin Ave., Minneapolis, Minn.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS (Abrasive Contact)

Chicago Rubber Co., 2620 North Clybourn, Chicago 14, Ill.

WHEELS (Wire Brush)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

WIRE NAILS

Republic Steel Corp., 3100 E. 75th St., Cleveland 27, Ohio.

WIRE ROPE

American Chain & Cable Co., Inc., 271 South Pennsylvania Ave., Wilkes-Barre, Pa.
Union Wire Rope Co., 21st & Manchester Ave., Kansas City, Mo.

WOODWORKING MACHINERY

Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Cystoscope Makers Inc., 129 East 78th St., New York, N. Y.
Triplett & Barton Inc., 831 North Lake Ave., P.O. Box 3128, Burbank, Calif.

X-RAY FILM and ACCESSORIERS

Eastman Kodak Co., Rochester, N. Y.

ZINC

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.

ZINC BASE DIE CASTING ALLOYS

R. Lavin & Sons Inc., 3426 So. Kedzie Ave., Chicago 23, Ill.

ZIRCON SAND

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

THEY STAND THE HEAT!

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MELTING POTS

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INGOT MOLDS

... FOR MELTING NONFERROUS METALS

MADE OF SPECIAL M-HEAT RESISTING IRON

WRITE FOR SCHEDULE OF 40 SIZES

Acme FOUNDRY COMPANY

2502 22nd St. Phone: Tashmoo 5-2404 Detroit 16, Mich.

CLASSIFIED ADVERTISING

Help Wanted

CAREER OPPORTUNITIES FOR ENGINEERS

Wheelabrator Corporation is looking for graduate engineers in various divisions: for sales, engineering design, dust and fume control, etc.

Young men with ability and ambition are needed for trainee and staff positions. Good pay and benefits plus ample opportunity for advancement make possible individual growth and development with expanding organization.

Send full information on training and experience to:

WHEELABRATOR CORPORATION
(Formerly American Wheelabrator & Equipment Corp.)
MISHAWAKA, INDIANA

Help Wanted

METALLURGIST

Technically trained metallurgist with nonferrous foundry experience, including supervision of production personnel. To take full charge of high volume, fully mechanized foundry producing brass plumbing fixtures and located in small, attractive central Ohio town. Please submit complete, detailed application including training, experience, and references, along with age and salary requirement. All replies will be treated confidentially.

BOX 705, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

METALLURGIST OR METALLURGICAL ENGINEER

Recent graduate, needed for manufacturing research laboratory of progressive steel castings company in midwest. Opportunity to do applied research and pilot plant work on metallurgy of cast steels, development of new molding techniques and casting processing methods. Experience useful but not essential. In reply indicate education background, military status and experience. Address: Box 676, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY DRAFTSMAN

Wanted: Foundry engineering draftsman for layout work and quantity surveys for cupola installations by a recently organized steel plant engineering firm with strong financial backing which are extending their activities to include the installation of hot blast cupolas under an exclusive license from an internationally known German hot blast cupola firm. Address: Box 729, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

FOUNDRY ENGINEER

For progressive foundry in Indiana. Mechanical graduate not necessary. Highway and building construction background desirable. To work on new machinery installation. Building changes. Machinery efficiency, new methods and quality control. Write giving full details of personal background, experience, and starting salary expected.

BOX 704, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PRODUCTION FOREMAN

Large malleable foundry has opening for production foreman thoroughly familiar with molding of malleable castings. Send resume of experience and salary desired. All replies held confidential.

BOX 709, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY TECHNICIAN

An Eastern Canadian Mechanized Foundry has an opening for a Foundry Technician as a trouble shooter. He should have experience in pattern making, gating, layout and general foundry techniques for brass and bronze castings. Some snap-flask experience would be beneficial. Salary will depend on qualifications. Address: Box 718, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Cleaning room supervisor for steel foundry in Los Angeles area. Submit experience and personal history. Address: Box 706, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

WELL-ESTABLISHED 4A-RATED COMPANY, LOCATED IN MIDDLE ATLANTIC STATE, IS SEEKING A WORKS MANAGER FOR ONE OF ITS DIVISIONS.

Applicant must have sound knowledge of foundry practices and at least ten to fifteen years' experience in medium and heavy casting work and proven record of efficient management. Experience in mass production techniques would be most helpful.

Salary open and commensurate with qualifications.

Replies confidential. Send fully-detailed resume giving experience, training, and salary requirements to:

BOX 719, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ELECTRIC MELTING SUPERVISOR OR MELTING METALLURGIST

To supervise melting operation in medium-size alloy foundry. Metallurgical background required. Degree preferred but not necessary. Expanding operation, progressive management. Send resume including past earnings to:

BOX 262
ELIZABETH, NEW JERSEY

FOUNDRY ENGINEER

Wanted: Foundry engineer with estimating experience familiar with cupola practice for key position with a recently organized well financed engineering firm which has acquired the exclusive license for an internationally known German hot blast cupola. The principals of the engineering firm have specialized in steel plant engineering and wish to supplement their experience with foundry experience. Exceptionally large volume of work pending affords unusual opportunities. Address: Box 728, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ASSISTANT

Foundry assistant needed by captive gray iron foundry of medium size heavy process machinery manufacturer. Young college engineer graduate preferred. Should have had some foundry experience. Is to help increase plant efficiency, planning, research and operation. Company has liberal profit sharing plan. Salary open. Location S.E. Pennsylvania. Address: Box 713, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MOLDING FOREMAN OR ASSISTANT

Mechanized Midwest foundry wants aggressive foreman for molding department. Give personal history, references, and salary. Address: Box 708, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

HELP WANTED

Superintendent for steel foundry specializing in medium and heavy work. Must know all phases of foundry operations. In Midwest location. Address: Box 674, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL FOREMAN CLEANING ROOM

Large eastern steel foundry has an excellent opening for a general foreman cleaning room. In reply give age, experience, references, and salary desired. Address: Box 714, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

NONFERROUS FOUNDRY FOREMAN

Capable of taking complete charge of foundry operation and estimating. Prefer metallurgical training. Medium-sized foundry. Please furnish references first letter. Address: Box 710, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TECHNICAL SALES ENGINEERS

AGGRESSIVE AND RAPIDLY EXPANDING COMPANY WITH WORLD-WIDE CONNECTIONS SUPPLYING TECHNICAL SERVICE AND PRODUCTS DIRECT TO FOUNDRIES SEEKS FIRST-CLASS SALES ENGINEERS, AGE 30-40. METALLURGICAL OR FOUNDRY TRADE EXPERIENCE REQUIRED BUT OUTSTANDING SALES ABILITY FIRST CONSIDERATION. SALARY AND EXPENSES. ATTRACTIVE OFFER FOR RIGHT MAN.

BOX 731, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquiries Invited
From Employers and Qualified Applicants.
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR 220 SOUTH STATE ST., CHICAGO, ILL.

Help Wanted

DESIGNERS—DRAFTSMEN—ENGINEERS

Experienced in foundry layouts and equipment. Age 30-45. Send experience record, personal data, recent photo and references.

BOX 730, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

Positions Wanted

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested, Address: Box 703, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

INDUSTRIAL OR SALES ENGINEER

Thorough knowledge and experience in all phases of ferrous and nonferrous foundry operations and management. Plant lay-out, pattern shop, equipment design, installation of methods, standards and equipment, research and development. Desire position with greater challenge and compensation. Will travel. Address: Box 717, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY WORKS MANAGER

EXECUTIVE

Experience in all phases of foundry operations and management. Thorough knowledge of machine shop, pattern shop, engineering, metallurgy, foundry cost and estimating, sales and industrial relations. Registered mechanical engineer, 25 years' experience foreman, superintendent, general manager and vice president. Foundry running 150 tons daily. Address: Box 723, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT (English)

High frequency induction furnace superintendent seeking position. Fourteen years' experience in production of stainless steel and alloy castings, twelve years as analytical chemist. Diplomas in metallurgy. Address: Box 722, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

Gray iron or malleable molding preferred in northern Illinois or southern Wisconsin. Twelve years' molding experience, 14 years' supervisory. Presently employed. Address: Box 707, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SAND AND QUALITY CONTROL

Supplemental to the routine work of your organization for purpose of improving quantity, cost or quality of product. One to three months' contract. Reply promptly for early service. Address: Box 727, FOUNDRY, Penton Bldg., Cleveland, 13, Ohio.

SUPERINTENDENT

Position in gray iron or nonferrous. Thirty years' experience, practical and technical. Well versed in all departments, medium-sized jobbing or production. Presently employed as superintendent. Address: Box 725, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Am thoroughly qualified to produce quality castings in any ferrous foundry by training the supervisors and setting up standard practices in all departments so that costs and scrap will be kept at uniformly low levels. Am available now. Address: Box 732, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

SALESMAN

Gray iron, nonferrous and permanent mold castings. Quality and delivery very important. Location Michigan. If interested, Address: Box 721, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURERS' REPRESENTATIVE

Would like to sell Meehanite castings on commission. Address: Box 711, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHICAGOLAND REPRESENTATION

Nonferrous foundry representative in Chicago and vicinity would like to represent medium-sized, progressive iron and steel foundries. Address: Box 698, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXPERIENCED PRACTICAL FOUNDRYMAN

On both steel, iron and manganese steel. Have been general foreman, superintendent and consultant. Can furnish the best reference. Address: Box 694, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALESMEN

We want several live-wire salesmen who are now working on salary and who think they could increase their earnings by selling on liberal commission. These men must have followings in industries buying master alloys and hardeners. Please give full details in your first letter, i.e., personal history, employment record, territory, etc. Your information will be held in strictest confidence. Address: Box 665, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Salesman, well-established refractory company wishes experienced melting foundryman located in Detroit area to cover Michigan and parts of Indiana. Address: Box 715, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

DISTRIBUTORS WANTED

London, England, manufacturers of specially developed Plastic Stone for the production of patterns and pattern plates for use on jolt squeeze molding machines, desire to appoint sales distributors in U. S. A. Managing Director will be visiting New York, Jacksonville, Cleveland and Los Angeles end of October, early November. Please write to: F. & M. SUPPLIES LTD., 4, BROAD STREET PLACE, LONDON, E.C. 2.

Foundry Consultants

FOUNDRY CONSULTANT
CORE & MOLD BLOWING

Utilize the latest in conventional and shell CORE BLOWING METHODS to off-set present high costs and competition by use of: Existing Equipment when Possible—Improved Equipment Design—Improved Methods and Standards—Training of Supervision and Personnel. For CONSULTING SERVICE CONTACT: Box 716, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CONSULTANT

Send Drawing for complete estimating service, casting weight, pattern layout, flask size pattern cost and core and mold cost. Any class, any metal. A complete service at a reasonable cost. Address: J. W. PARK, 285 E. 16th Avenue, Columbus, Ohio.

CLASSIFIED ADVERTISING

Opportunity

PERMANENT MOLD METHOD AVAILABLE

The Wagner Permanent Mold Co., 2910 Empire Avenue, Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries regarding this method and process.

Wanted-To-Buy

WANTED

OSBORN ROTO-LIFT
MOLDING MACHINE
MODEL NO. 3161

PEORIA MALLEABLE CASTINGS CO.
PEORIA, ILLINOIS
PHONE 2-5401

WANTED

45" and 55" lifting magnets, any condition.

call or write:
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120 CHURCH STREET
BUFFALO 2, N. Y.
TELE:
CLEVELAND 4758.

WANTED TO BUY
STEEL FLASKS—STERLING OR EQUAL
Approximate Sizes Required
28 x 46
28 x 60
28 x 70
Advise what you have and price wanted

JOHNSTON & JENNINGS FOUNDRY CORP.
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CHICAGO, ILLINOIS

WANTED TO BUY

One only 20 ton Lip Pour Ladle

LANSING FOUNDRY COMPANY
BOX 71
LANSING, MICHIGAN

MACHINERY WANTED

Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders. Conveyors. Address: INSTRUMENT SERVICE COMPANY, INC., HOBOKEN, NEW JERSEY. BA 7-0600.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EQUIPMENT WANTED

Lindberg vertical type draw furnace-gas fired, work chamber 5-7' diameter, 7-9' deep. Address: Box 720, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

2—Osborn No. 403W jolt rollover pattern draw molding machines, 20" x 50" table, 15" draw. Must be in good operating condition. Address: Box 690, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

Bargain $1.35 sq. ft.

FACTORY BUILDING
FOR SALE

48,000 sq. ft., one floor on 3½ acres, and 360 ft, RR siding—Delaware & Hudson Railroad

Includes high pressure boiler, air compressor and enamel baking oven.

High ceiling—trucking dock—floor load unlimited.

With or without foundry equipment and metal working machinery.

Community cooperation.

Located in Dickson City, lovely small town—4 miles from Scranton, Pa.

Capable and productive, Pennsylvania labor, unsurpassed and plentiful.

Most unusual opportunity due to unusual circumstances.

CONTACT: HINERFELD REALTY CO., SCRANTON, PENNSYLVANIA

GRAY IRON FOUNDRY

Situated in growing industrial area close to MAJOR STEEL MILL. Raw material supply excellent. Complete modern pattern shop. Adjacent to Union Pacific and Denver & Rio Grande Railroad trackage.

TRACY-COLLINS TRUST COMPANY
REAL ESTATE DEPARTMENT
151 SOUTH MAIN STREET
SALT LAKE CITY,UTAH

FOUNDRY FOR SALE (OR LEASE)

Established going gray iron foundry in Wisconsin. Fully equipped; manufacturing own line and general jobbing. Capacity up to ten tons per day. Over $70,000 value. Can be purchased for less than half. Principals only. Terms. Address: Box 662, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Modern established aluminum foundry and product line, Mold, conveyor, overhead sand handling, etc. Good location in Eastern Iowa. Address: Box 671, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Lease

FOR LEASE

200,000 sq. ft. foundry space, all on one floor. Formerly an aluminum foundry. Has two high pressure boilers, sand silos and railroad siding.

Call: WOODWARD 2-1694
DETROIT, MICHIGAN

FOR LEASE

Aluminum sand foundry completely equipped. 35,000 sq. ft. of floor space, located in small Missouri town with good transportation and labor supply. Address: BERKLEY JONES, 320 N. 4TH STREET, ST. LOUIS 2, MISSOURI.

FOUNDRY FOR LEASE

Established gray iron jobbing shop. Capacity ten tons per day. Pattern and machine shop. Address: Box 712, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

MOTORS — GENERATORS
TRANSFORMERS

Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 6783
P. O. Box 51 — Rochester 1, New York

For Sale

FOR SALE

MOLDING MACHINES

1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G. Portable.
1—SPO #305 Jolt Stripper.
2—No. 275 Osborn jolt squeezers. Stationary.
1—#276 Osborn Jolt Squeeze. Stationary.

CORE OVENS

1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.

BLOWERS FOR CUPOLAS AND FURNACES

1—Connersville Rotary Blower, 3500 CFM.
2—Spencer Turbine, 30 HP, 3000 CFM, 24 oz.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
1—Connersville rotary blower 22 x 66 45 cu ft per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT

1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld Stationary Brass, oil or gas burner, 2000# cap.
1—Hausfeld Tilting crucible, gas, 250# Al, Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS

1—Beardsley & Piper Model S Screenerator.
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
1—Sly Tumbler 24" x 40".
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 2 HP.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.

Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

For Sale

NEVER USED
PERFECT CONDITION
SANDSLINGER EQUIPMENT

COST OVER $20,000.
WILL SELL AT 25% DISCOUNT

Beardsley Piper Stationary Sandslinger, double belt type, Serial S-676-5403, 5'0" First arm, 4'0" Rowing unit, 19" Diameter Impeller Head, 4" tip, 220 volt, two speed 16/25 H.P. 1200/1800 RPM Rowing Motor. Floodlight.

Beardsley Piper 8-Ton Roto-Feed, 5 H.P. Totally enclosed, fan-cooled, high torque, 55° C rise continuous duty motor. Serial # F-334-5403.

Model 920 RCX, Johnston & Jennings Rol-A-Draw Molding Machine, 2000# capacity, Pattern Draw 20". Serial JJM-238-5403.

30' Link Belt Bucket Elevator, outside 48" x 24", inside 42" x 17¾", Bucket size 12" x 7" x 7¼", new bearings, Motor and gear drive overhauled. Excellent condition.

WHY WAIT FOR DELIVERY WHEN YOU CAN HAVE IMMEDIATE SHIPMENT.

BOX 726, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

$11.00 EACH

SNAGGING WHEELS

500, never used, perfect condition, aluminum oxide, resinoid 18" x 2" x 7"—Hampden, Macklin, Peninsular and

499 Carborundum Co. aloxite resinoid, plate mount disc grinders, 18 x 1½ x 5

Satisfaction Guaranteed

FLUID DRIVE ENGINEERING CO.
3105 E. CHELTENHAM PLACE
CHICAGO 49, ILLINOIS

FOR SALE

One Ingersoll-Rand Type FS-563 Blower, Direct connected and roller pedestal bearing construction. Serial #S563-J-10, 11,000 CFM, 1.5 lbs. pressure, 3500 RPM complete with 100 HP Fairbanks Morse motor, Type QZC. 3450 RPM. Used only a short time.
Several 42" Dia. x 72" Type "C" Sly Tumbling Mills. Direct and V-Belt Drives, with or without motors.
Both items very reasonably priced.

NEW HAVEN FOUNDRY
NEW HAVEN, MICHIGAN

FOR SALE

American Wheelabrator, swing table 86" diameter, complete with motors and control panel. Practically new.

Reda #550 series combination oil fired-hydraulic tilting furnace, with tank.

Beardsley & Piper motive type sand slinger 19" head adjustable liner—6'0" arm, 11'0" conveyor arm, 12'0" on center bucket elevator, 31 buckets.

PYOTT FOUNDRY AND MACHINE CO.
328 NORTH SANGAMON STREET
CHICAGO 7, ILLINOIS

STEEL MELTING FURNACE
Detroit Rocker

1—350 lb. cold charge, never used, Cost $10,000, will sacrifice for $5,000
1—60 lb. cold charge, slightly used, $1,500
Both units have spare shells complete with electrical panels and disconnect switches. Transformers wired for 220 volts, 60 cycle primary.

FALLON INDUSTRIES,
25800 GROESBECK HWY.
ROSEVILLE, MICHIGAN
PRESCOTT 7-2500

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

For Sale

FOR SALE

The equipment listed is almost new and priced to sell!

6—Osborn type 2047—jolt rollover and pattern draw—size—24" x 24".
2—International clamp and draw—76" x 9½" draw.
1—Kane and Roach core wire straightener—No. 5 DX—⅜" capacity.

All equipment can be inspected at our warehouse and immediately available.

GLOBE TRADING COMPANY
1815 FRANKLIN STREET
DETROIT 7, MICHIGAN
PHONE: WOODWARD 1-8277

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3.
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.

OUR 38th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N.Y. TEL. BA 7-0600

FOR SALE

Turbo Blowers with Motors
1—GE, 4500 CFM, 16 oz. . . .$500.00
1—Spencer, 6750 CFM, 16 oz. .$750.00
Excellent Condition

GLAZER BROTHERS
ANDERSON, INDIANA
PHONE 7713

FOR SALE

Heller Universal type 26" cold saw, excellent condition, used little, complete. Wired 220/3/60. Includes Heller automatic saw sharpener and ten saws.

BOX 724, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

Stearns Magnetic Pulley, 25" long, 18" diameter, 230 volt. New shop-worn.

PLEASANT ELECTRIC CO.
1725-27 CENTRAL AVENUE
CINCINNATI 14, OHIO

FOR SALE

Simpson 3C Sand Mix Muller. 8 ft. diam. pan, standard mullers, 2 door discharge. Falk herringbone speed reducer for motor drive. 35 HP required. Serial No. 12317. Inventory of repair parts available.

CLARK EQUIPMENT COMPANY
BUCHANAN, MICHIGAN

FOR SALE

#45 American Wheelabrator Dustube Collector with exhaust fan and motor; sufficient capacity for 36" x 42" Wheelabrator. Has seen very little service and in excellent shape.

RED JACKET MFG. CO.
DAVENPORT, IOWA

FOR SALE

SHALCO SHELL MOLDING MACHINE. COMPLETE WITH THERMOSTATIC CONTROL. NEVER USED. REAL BARGAIN.

HAXTON FOUNDRY
411 N. CLAREMONT AVE.
CHICAGO 12, ILLINOIS

HAVE YOU EVER NOTICED the numerous types of headings under which classified ads are listed? Whether interested in obtaining qualified personnel, selling used machinery, wanting to buy equipment, or are yourself looking for a better position, you should seriously consider advertising in the classified section of FOUNDRY MAGAZINE.

•

FOUNDRY has 45,000 readers which cover the entire foundry industry. That means that for a nominal sum you get the widest possible coverage of the industry and your advertisement reaches "just the right people".

•

The Classified Staff is equipped to handle all details in the placement of your ad.

Classified

ADVERTISING DEPT.
FOUNDRY
CLEVELAND 13, OHIO

For Sale

JOLT SQUEEZE STRIP PIN LIFT MOLDING MACHINES

#726 PJ Osborn; 38" x 57" table; 26" squeeze cylinder 11" jolt cylinder; 10" draw with hopper; 9" squeeze stroke; Serial Number 11730-A; 1948 machine; 4000# jolt capacity; also #724 PJ.
#163 Milwaukee—Table size 16 x 26; actual capacity 16" x 44"; frame lift type; 1500 lb. capacity; also #143 and #184 Milwaukee.
Nicholls—Type B; Serial #45069 & 46604—1945 machines 14" cylinder; 14 x 36 table.
JOLT ROLLOVER MOLDING MACHINES
#918 Johnston & Jennings—44" x 54"; 18" draw.
International—Type G; Table size 30" x 12"; 1942 machines. New rings and new gaskets; very good condition.
International—Type F; Table size 31" x 12".
SPO—Model 506-1; Serial Number R119; Table size 24" x 25", 10" draw; 1942 machine—Rebuilt.
Osborn #2047-4—Power rollovers. Cap. 18" x 24"; stationary; 1942 machines.
Osborn—#601, #602, and #605.

OTHER MOLDING MACHINES AVAILABLE IN STOCK

Nicholls—Type D—Jolt, squeeze.
#275 Osborn Jolt Squeezers.
Champion Push Off machines; Model LLA-45; Table size 45 x 26.

MISCELLANEOUS EQUIPMENT

Osborn Core Blowers Model 91, 193, and 94.
U. S. 7½ HP 3 speed grinders, 28" wheel.
Beardsley & Piper—#50 Speedmuller.
Beardsley & Piper Screenerators—Model S.
Climax Wire Straightener—#2; cap. $\frac{1}{16}$" to ¼".
2000 lb. Fisher & Stroman Tilting Furnaces.
Dielectric Core Ovens.

FOR THE BEST DEAL CALL

BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
TELEPHONE: EXPRESS 1-8930

For Sale

FOR SALE
TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6835	20oz.	Spencer	340	20oz.	A-B
6000	32oz.	Ing.-Rand	320	12oz.	Spencer
4700	32oz.	Ing.-Rand	9000	6"SP	Northern
2700	16oz.	Spencer	4200	8½"SP	Buffalo
2500	7 oz.	Sturt.	3420	8"SP	N.Y.
1150	20oz.	No. Am.	2700	⅝"SP	Ilg
800	13oz.	Buffalo	2500	½"SP	American
500	12oz.	Buffalo	2344	2"SP	Clarage
380	16oz.	No. Am.	1100	4½"SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

WE • BUY • SELL • TRADE

15" Continuous Wheelabrator	$4,500.00
48 x 48" Wheelabrator Tumblast	5,000.00
36 x 42" Wheelabrator Tumblast	3,000.00
27 x 36" Wheelabrator Tumblast	2,500.00
Pangborn ES-421 Shell Blasting Machine (Like New)	3,500.00
8 ft. American Table with 8-28" Auxiliary Tables	2,500.00
4 ft. American Table	2,500.00
Vapor Blasting Machine	750.00

ATTENTION CANADIAN BUYERS

We still have two 42 x 48 wheelabrators in Canada. These can be purchased duty free. Priced at $2,500.00 and $3000.00. Excellent condition. Also 42 x 48 Wheelabrators in Detroit at $950.00 and $1,500.00.

DIAMOND SAND BLAST INC.
5654 WEST JEFFERSON AVE.
DETROIT 9, MICHIGAN
PHONE VINEWOOD 3-6750

For Sale

FOR SALE

One Pangborn 6' type LG Blast cleaning table. Perfect condition, Price $1250.00, with supply of spare parts. Can be seen in operation.

One Simplicity 3 x 3' Model SS shakeout. Price $500.00 with Drive. Completely rebuilt and in excellent condition.

One Demmler Style #2 core blower for 20 pound core complete with air clamps, Price $150.00. F.O.B. New Castle, Pa.

NEW CASTLE FOUNDRY COMPANY
P.O. BOX 903
NEW CASTLE, PENNSYLVANIA

FOR SALE

1—FS 347 Ingersoll-Rand Centrifugal Foundry Blower, Serial No. S-347L3, complete with motor. Intake volume 4000 cfm.

1—Type G Ingersoll-Rand Centrifugal Foundry Blower, Serial No. 16G1415D8, complete with motor. Intake volume 2200 cfm.

1—#5½ Roots-Connersville, Figure 8, Impeller Type Foundry Blower, Serial No. 30642, designed for 28.2 cubic foot per revolution at a maximum speed of 220 RPM, without motor.

For further specifications, write

BEDFORD FOUNDRY & MACHINE COMPANY
1108 FIFTH STREET
BEDFORD, INDIANA

FOR SALE
HOUGH PAYLOADERS

Model HA new in 1953. Complete overhaul by factory agency in July 1955 and has not been used since. With practically new tires. A good buy at $2,250.00 F.O.B. Toledo, Ohio.

THE ENSIGN FOUNDRY CO.
TOLEDO 6, OHIO

AT AUCTION

IN LIQUIDATION
ON THE PREMISES
45 CODDING ST., PROVIDENCE, R. I.
(Off Westminster Street)

THE VALUABLE MACHINERY and EQUIPMENT of BUILDERS IRON FOUNDRY, INC.

A Grey Iron Foundry Castings 1/16 to 30,000 lbs.
Shell Mold Castings

TUESDAY, OCTOBER 18, 1955 at 10 A.M. E.D.T.

The Sale Includes:

FOUNDRY MACHINERY and EQUIPMENT. American Tumblast Wheelabrator Pangborn Tumblast, No. 60 Speed Muller with Beardsley and Piper Skip Hoist and Preparator. Simpson Mullers. Portable & Floor Type Jolt Roll Overs by U. S., Tabor & Osborne. Adams & International Jolt Squeezers **Demmler & Federal San Blo Machines, Newaygo Handy Sandys w. Bucket Elevators.** Young Bros. Foundry Equipment and Whiting Core Ovens. Modern Equipment Co. Tilting Ladles 600 lb. to 15 ton cap. Yale, Budgit, Niles & Shepard & I. R. **Elec. & Air Hoists** (¼ to 2 ton.) Schrader, Cyclone & Peerless Chain Hoists. **Approx. 3000' "I" Beam Monorail Tracking & Rails. Milwaukee P & H-B F L & Whiting Elec Hydraulic & Hand Operated Traveling Cranes 10-20 & 25 ton cap.** Spencer, Boland, Sturtevant & Garden City Blowers. **I-R & Worthington Duplex Compound Compressors.** Paxton & Whiting Cupolas 5' dia. **Charging Scales, Trucks and Stands.** Tumbling Barrels, Bucket Elevators, Belt Conveyor, Snagging Grinder, **Weight-o-graph & Fairbanks Floor & Dial Scales,** Vibrators, **Elec. Drying Lights,** Truck type Battery Charger & Arc Rectifier, **Hough Pay Loaders, Tow Motor 1 & 1½ ton cap.** Elwell Elec. Boom Truck 1 ton cap. **Approx. 20 tons Channel Iron Sand Bin Partitions, Jack Lift Trucks.**

SHELL MOLD EQUIPMENT Including Auto & Semi-Auto Molders w/Ovens, Sand Boxes, Controls, Conveyors, Hoists, Scales, Pouring Boxes, etc.

MISCELLANEOUS Steel Core Plates, Iron & Steel Flasks, Air Tampers, Bale Trucks, Rubber Tired Barrows & Flat Trucks, **Portable Lamp Dryers,** Assorted Foundry Tools, Water Coolers, Fluorescent Lights, etc., etc.

MACHINE and WOODWORKING TOOLS. Do End Elec. Grinder, Disc Grinders, Drill Presses, Amer. Radial Drill, B & S 2B Milling Machine, King Vert. Boring Mill, LeBlond & Prentice Engine Lathes, **Oster Portable Elec. Pipe Threader,** Arbor Press, Round Head Jointer, Iron Top Saw Table, **Hardness Tester,** Layout Plates, etc.

Detailed Descriptive Catalog on Request. Sale is by Order of B.I.F. Industries, Inc., Owners

SAMUEL T. FREEMAN & COMPANY, AUCTIONEERS

80 FEDERAL STREET • Tel. Liberty 2-9226 • BOSTON 10, MASS.
1808 Chestnut Street, Philadelphia 3, Pa.

A Century and a Half of Selling at Auction.

Electric MELTING FURNACES

MOST COMPLETE STOCK IN THE WORLD

1—1500 KVA G. E. Transformer with taps for 11,000 or 13,800 volts.

1—Chicago 3000# Electric Furnace, tilt back head. 4" electrodes, 800 KVA, 12,000 V transformer. Complete. May be seen in place Chicago.

1—Swindell 8 ton 9' diameter Shell Electric Furnace, 2500 KVA transformer, 13,800 or 11,000 V. In our Chicago warehouse.

Lectromelt 500# Side Charge Type T, 300-375 KVA transformer, 2300 V primary, Moore controls, G. E. circuit breaker. Late type. Now in our Chicago warehouse.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Pennsylvania 1500 KVA transformer, 12000 V. Never used since rebuilt. With complete controls, mostly new, needed for operation of a furnace. New control panel, Field Rheostat, 25 HP, 440 V MG set.

ACME

ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire foundry

126 South Clinton Street • *Phone:* ANdover 3-3430 • Chicago 6, Illinois

MONA

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words or less, $3.00. Additional words 10c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $6.00. Additional words 20c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 18.00	$ 16.50	$ 15.00	$ 13.50
2 inches	32.50	30.00	27.50	25.00
3 inches	46.50	43.00	39.50	36.00
4 inches	60.00	55.50	51.00	46.50
5 inches	73.00	67.50	62.00	56.50
6 inches	85.50	79.00	72.50	66.00
7 inches	97.50	90.00	82.50	75.00
8 inches	109.00	100.50	92.00	83.50
9 inches	120.00	110.50	101.00	91.50
10 inches (1 col.)	130.50	120.00	109.50	99.00
Half page	195.00	180.00	165.00	150.00
Full page	330.00	300.00	270.00	240.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO

5 STEEL APRON CONVEYORS
- 1—120′ centers x 36″ wide Midwest
- 1—57′ centers x 30″ Palmer-Bee "Kantleak" variable speed.
- 1—44′ centers x 30″ wide Link-Belt
- 1—19′ centers x 30″ wide Palmer-Bee
- 1—5′6″ centers x 30″ wide Palmer-Bee

3 FLAT BELT CONVEYORS 2—30″ x 45′ x 110′, 1—36″ x 35′

1 SAND MULLER, B-P #30 and #70, 7 cu. ft. Mulbaro

2 CUPOLAS #11 Whiting, 1—#3½ Modern

1 BELLEVUE ANNEALING FURNACE—Oil fired all controls, box type 36″ wide x 72″ deep x 24″ high, overall 69″ wide, 88½″ deep, 71″ high. Height clearance required 10′.

. . SPECIAL SALE . .

1 complete gray iron foundry, 18000 sq. ft., #7 Whiting cupola. R. R. Siding, in Belleville, Ohio, 80 miles southwest of Cleveland

MISCELLANEOUS MOLDING MACHINES

- 2—Tabor 22″ x 32″ table, 10″ draw, 600 lbs. cap., air clamps.
- 4—International Type G, Air Rollover, Foot draw, 600#, size 24″ x 10″.
- 6—International Type RJ, size 20″ x 8″, Air jolt.
- 4—International Type R, size 20″ x 8″.
- 3—Champion Type W22″ and W16″, 12″ and 8″ draw, hand rollover.

Rollovers

Davenport
- 2—A40, 40″ x 64″ table, 3500 lbs. jolt, 24″ draw
- 2—SA40, 42″ x 50″ table, 3000 lbs. jolt, 18″ draw
- 1—SA28, 30″ x 40″ table, 1500 lbs. jolt, 12″ draw

Herman
- 1—40″ x 60″ table, 6000 lbs. jolt, 20″ draw

Osborn
- 1—405-95, 40″ x 64″ table, 3500 lbs. jolt, 26″ draw

Pushoff: 1—Osborn 3′ x 16′ table.

Jolt Squeezers: J & J, Milwaukee, Osborn, SPO

Jolt Strippers:
- 1—Milwaukee, 2800 lbs, jolt, 32″ x 38″ table, 12″ draw.
- 2—Milwaukee, 900 lbs. jolt, 17″ x 21″ table, 6″ draw.
- 1—Davenport AJS34, 36″ x 46″ table, 2500 lbs. jolt, 12″ draw
- 4—Nichols Frame strip 42″ x 62″, 10000 lbs. jolt, 12″ draw
- 2—Herman 40″ x 60″ table, 6000 lbs. jolt, 20″ draw

Jolt Squeeze Pin Lift: 1—Milwaukee 145-1, 1700 lbs. jolt, 14″ squeeze cyl., 8″ draw, 25″ x 30″ table.
- 6—Milwaukee, 600 lbs. cap., 4″ draw, 17″ x 21″ table.
- 2—Osborn 814-P, 700 lbs. jolt, 8″ draw, 14″ squeeze cyl.
- 5—Osborn 720U, 600 lbs. jolt, 4″ draw, 11″ squeeze cyl.
- 2—Nichols 24-54D, 24″ squeeze piston, 1600 lbs. jolt, 8″ draw

Jolt Plain: 1—International Type J, 3000 lbs. jolt, 36″ x 48″ table.
- 1—International Type J, 10,000 lbs. jolt 76″ x 76″ table.

We carry all makes and types of foundry equipment in stock. Send for our complete listing.

OUR GUARANTEE

IF YOU ARE NOT SATISFIED WITH OUR EQUIPMENT, YOU MAY RETURN IT FOR A FULL REFUND.

We Buy and Sell One Piece of Equipment or Complete Foundries

Telephone . . . GLenville 1-1222

GUARANTEED FOUNDRY EQUIPMENT

NOW INVITES YOU TO VISIT OUR SHOWROOM AND ENJOY THE *WORLD SERIES*. LET US HELP YOU SECURE YOUR ACCOMMODATIONS.

AIR & ELECTRIC HOISTS

12—**INGERSOLL-RAND** RC-7 Air Bloc Type, 700 lb. cap., w/roller chain.
194 **INGERSOLL-RAND** RC-5 Air Bloc Type Air Hoists, 500 lb. cap.
25—**INGERSOLL-RAND** Air Hoists, Sizes A, B, D, D-6 and E, 500 to 10,000 lb.
1—**ELECTRO-LIFT** 3000 lbs cap. 4 HP
1—**SHAW-BOX** Load Lifter Jr. 1000 lbs

CORE BLOWERS

1—**#4 DEMMLER**
1—**#2 DEMMLER.**
2—**#92 OSBORN.**
2—**#193 OSBORN.**
1—**#91 OSBORN.**
1—**#192 OSBORN.**
2—CB-400 **CHAMPIONS.**
6—**MILWAUKEE**—Taccone Model A-3.
5—**REDFORD** #1 Bench Type w/cartridges.

CUT-OFF SAWS & STRAIGHTENERS

1—**DEWALT** Model Me2V Foundry Type Cut-Off Saw with 10 HP motor.
3—**CLIMAX** Nos. 2, 2A & 3 Wire Straighteners
2—**TESSMER** Models "H" & "I" Sprue Cutters

CORE OVENS

1—**FOUNDRY EQUIPMENT** 4 Compartment 6' x 8' x 10' each, gas fired with controls, recirculating, like NEW.
1—**INDUCTION HEATING** Dialectric Model M-800A, 600 lbs. per hour 300 hrs. use.
1—**INDUSTRIAL** Continuous Type, trays 18" x 80" long, gas fired recirculating.
1—**DETROIT** Vertical Tower 45' high, racks 14" w v 60" long, 31".

CUPOLA BLOWERS & ACCESSORIES

1—**BASIC REFRACTORIES BRI** Gun, Model A10 (similar to Bondactor).
1—**FOXBORO** Air Weight Controller.
1—**HAUCK** Lighter Tank & Torch.
1—**WHITING** No. 6 Cupola.
1—**ROOTS CONNERSVILLE** Rotary Positive Blower, size 5½, with 40 HP.
1—**INGERSOLL-RAND** Centrifugal Type FS-367 with 100 HP motor.
7—Furnace Blowers 1-3-5-7½ HP, 16 oz.

DUST COLLECTORS & ROTO-CLONES

1—**AMERICAN AIR FILTER** No. 14 Type W arrangement "C" with sludge ejector.
1—**AMERICAN AIR FILTER** No. 27 Type W arrangement "C," with sludge ejector.
1—**AMERICAN AIR FILTER** Type N, Size 10 with No. 14 Roto-Clone & sludge ejector. Grinding Bench type.
1—**AMERICAN AIR FILTER** Type N Size 20, 20,000 CFM, with 75 HP motor.
1—**AMERICAN AIR FILTER** Type N, Size 24, 24,000 CFM, 75 HP motor.

ELECTRIC MELTING FURNACES

5—**DETROIT** Type AA Rocking 750 to 1000 lbs, w/250 KVA Transformers.

GAS & OIL FIRED FURNACES

1—**LINBERG-FISHER** MNP Size 1000, gas or oil w/3 HP motor & blower.
3—**LINDBERG-FISHER MNP** Size 2400 lbs gas or oil fired, motorized, complete.
1—**LINDBERG-FISHER MNP** Size 225 lbs. gas or oil, w/motor-blower etc.
2—**LINDBERG-FISHER** Type BBI, #225 & #400 crucibles, hand tilt, complete.
11—**HAUSFELD** #200 Crucible, stationary, gas fired, NEW 1952.
1—**STROMAN** Model NP, 125-175 Crucible, Mechanical Tilt, gas fired.
2—**CAMPBELL-HAUSFELD** IPNT Iron Pot Type, 2000#'s Cap, gas or oil.

G. E. INDUSTRIAL X-RAY

Model KX 10, Type 1, 115 volts, 50/60 cycles, 13 amps. Serial 425456.

GRINDERS—SWING—SNAGGING—STAND

2—**FOX** #5 High Speed Stand, wheel 24" x 3"—10 HP motor.
1—**FOX** #7 High Speed Stand, wheel 30" x 3"—15 HP motor.
1—**HAMMOND WR-1** Double End Snag, wheel 24" x 3"—10 HP motor.
1—**U. S.** Electric Swing Frame, 15 HP, 2 speed, wheel 24" x 3" x 12".
6—**U. S. ELECTRIC** #65 Snag Grinder, 15 & 20 HP—4 speeds, wheel 24" x 3".
2—**U. S. ELECTRIC** #64 Snag Grinders, 7½ hp, adjustable speed, wheel 14" x 3".

LADLES & POURING DEVICES

6—**INDUSTRIAL** Lip Pour 24" x 24" rated 1600 lbs. enclosed Timken Gearing.
4—**MODERN** 1500 lb. Cylindrical Type, 29" x 30", w/bails, covers & stands.
10—**WHITING** Models 1000 & 2000 Pouring Devices w/400 lb ladle, hand tilt.
3—**WHITING** 275# Cylindrical Type V-bail, 19" diam x 16" length, covered.
1—**WHITING** 10 ton lip pour, enclosed gear.

INDUCTION MELTING—HEAT TREATING

1—**LEPEL** 30 KW Spark Gap Converter w/controls & 20 lb furnace & stand.
1—**LINDBERG** Model 4860 GH, Cyclone Type gas fired, with all controls.
1—**GENERAL ELECTRIC** 1250 kva Induction M.G. set 3000 cycles, with 1850 HP
1—**GENERAL ELECTRIC** 300KW Induction MG Set, 2520 cycles—450 HP motor.

MUST BE SOLD

1—Whiting 15 ton capacity cab operated, ac crane, 66½' span, w/5 & 10 ton hoists. Rebuilt in 1952. May be seen under power in St. Louis, Mo.

MOLDING MACHINES

1—**B & P** Fully Automatic Shell Investment Unit. Pattern size 20" x 24".
2—**HERMAN** Jolt Rollover Pattern Draw, 6000 series, 42" x 78" table, 6000 lbs.
2—**HERMAN** 40" x 60" Plain Jolt.
1—**INTERNATIONAL** PKL Jolt Squeeze Strip, 18" x 24" table, 6" draw.
1—**INTERNATIONAL** LP-10 Jolt Pin Lift.
2—**INTERNATIONAL** Type G, Size 24 x 10
1—**JOHNSON & JENNINGS** #815 Jolt Rollover Pattern Draw, 30" x 40" table.
1—**JOHNSON & JENNINGS** 612RBP Jolt Rollover Pattern Draw, table size 24" x 30", 12" draw, 600# capacity.
1—**MILWAUKEE** No. 1536 Jolt Pin Lift table 32" x 38", 1500 lb. jolt, 12"
1—**MILWAUKEE** No. 125-3 Jolt Squeeze Pin Lift, table 21" x 27". 1200# jolt
1—**MILWAUKEE** #167 Jolt Squeeze Rollover Draw, 32" x 33" table, 12" draw, 16" Squeeze, 1000# Jolt.
2—**OSBORN** #710J Jolt Squeeze Pin Lift, 16" x 25" table, 6" draw, 10" squeeze.
1—**OSBORN** No. 563-9 Jolt Pin Lift 55" x 63" table, 12" draw, 7000 lbs. Jolt.
1—**OSBORN** #342-1 Jolt Rock-Over Pattern Draw, 23" x 38" table, 10" draw, 1000#.
2—**OSBORN** #405 Jolt Rollover, table 57" x 64", 26" draw, 3000 lbs jolt w/rollout.
4—**OSBORN** #210 PJ Jolt Squeezers.
4—**OSBORN** #40 & #42 Core Rollovers.
1—**OSBORN** 710PV Vibrating Jolt Squeeze Pin Lift, table 16" x 25", 6" draw.
6—**OSBORN** No. 212PJ Jolt Squeezers.
1—**SPO** #508 Jolt Rock-Over Pattern Draw, 28" x 30" table, 9" draw, 1200# jolt.
2—**TABOR** 22" x 32" Jar Rollovers.
2—**TABOR** 30" x 40" Jar Rollovers.

MATERIAL HANDLING EQUIPMENT

1—**FARQUHAR** 18" x 35' portable Trough.
1—**FARQUHAR** 18" x 19' Car Unloader.
500'—**MATHEWS** Gravity Roller Conveyor, 10"—16"—18" width FOUNDRY TYPE.
1—**LINK-BELT** Overhead Conveyor, 100' track, chain, trolleys, curved, motorized.
1—**ELECTRIC BRIDGE** Crane, 25' span, with 2 ton R & M Hoist, 150' track.
1—**JEFFREY** Trough Belt Conveyor, 75' centers, belt 24", with motor drive.
1—**JEFFREY** Trough Belt Conveyor, 103' centers, 24" wide, motor & drive.
3—**LOUDEN MONORAIL SYSTEMS,** "Super Track" (1) 110' of 6" I-beam & two 20' bridges (2) 140' of 6" I-beam & two 12' bridges (3) 130' of 11" I-beam & two 30' bridges; all complete.
1—**SIMPLICITY** Model OA-10-JA—24" x 16' long Vibrating Conveyor.

SAND MULLERS

1—**BEARDSLEY & PIPER** #50, Speed Muller w/skip hoist, dust hood, 50 HP.
1—**BEARDSLEY & PIPER** #70.
1—**CINCINNATI** Lab Muller ¼ HP motor.
1—**CLEARFIELD** #930, batch 30 to 40 cu. ft 9' pan, w/60 HP motor etc.
1—**SIMPSON** #1½ style UD—Skip Loader.
1—**SIMPSON** #2 style B—skip loader.
1—**SIMPSON** #1½, Style B separate drive, enclosed gears w/skip loader.
3—**SIMPSON** #2 style UD—skip loader.
1—**SIMPSON** #2F, Style UD, 80" pan dia., 2000 lb. batch size, 30 HP motor, with skip hoist, aerator, water meter.

SAND PREPARATORS

1—**B & P** #70 Portable Preparator w/gyrating screen, aerator, magnetic separator, 90 cu. ft. hopper.
6—**BEARDSLEY & PIPER** Models S, M and L Screenerators.
8—**ROYER** Sand Conditioners, all models, Jr., NC-2, NDP, C-2, etc., portable.

SAND CUTTERS—By "AMERICAN"

1—Model AM—Size 69/45.
1—Model AA—72" reel.
1—Model BD—Size 75/60.
1—Model M—Size 99/80.
1—Model M—Size 89/70.

SAND SLINGERS

1—**B & P** 19" Tractor Type, 13' arm.
1—**B & P** 16" Tractor Type, 13' arm, magnetic tower, 4' ramming 4" tip.

SHAKEOUTS & SCREENS

1—**ROYER** Combination Shakeout & Sand Conditioning unit, serial #ST-47.
4—**SIMPLICITY** 4' x 6' Model B, 5000#.
1—**SIMPLICITY** 4' x 10' Model D with Automatic Crusher, 15,000# load.
3—**SIMPLICITY** 3' x 6'—Model BG, 5000#.
1—**SIMPLICITY** 6' x 8' Model DE, Dual unit—4 bearings, split deck, W/2-20 HP motors.

SCALES

1—**FAIRBANKS MORSE** Open Dial, 4' x 5' platform, 6000 lb. capacity.
1—**TOLEDO** Open Dial 4' x 5' platform, 6000 lbs capacity.
1—**TOLEDO** Floor Type Platform, open dial, 200# capacity.

TUMBLING BARRELS

2—**SLY** 42" x 72" Square, with 10 HP Gearhead motor—magnetic brake.
1—**ROYERSFORD** 36" x 60" w/motor & drive.
1—**SLY** 36" x 60" Type C, 5HP Gearhead Motor—magnetic brake.
4—**WHITING** 48" x 72", 10 HP Gearhead Motor—magnetic brake.

WHEELABRATORS & TABLAST

1—**AMERICAN** 36" x 42" Tumblast, skip hoist dust collector. NEW 1951.
1—**AMERICAN** 42" x 48" Tumblast, with skip hoist.
1—**AMERICAN** 27" x 36" Tumblast with skip hoist loader.
1—**PANGBORN** 6 LG-14 Rotoblast table 6', with (6) 24" tables, new 1952.
1—**PANGBORN** 6 LF Rotoblast Table, 6' Diam. w/dust collector.

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1—85 HP G.E. Cupola Blower, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

CLEANING EQUIPMENT
1—AMERICAN #1MULTITABLE, 6 aux. tables 15", main table 45".
1—ROBBINS SHAKEOUT 4' x 2'.
1—PANGBORN #3½ GK ROTOBLAST.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
5—US GRINDERS, double end, 10, 15, 20 HP.
4—GRINDERS, Swing frame, 15 HP.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.
1—TABOR CUT-OFF Saw, 10HP.

CONVEYORS
4—SAND ELEVATORS, various sizes.
1—STEEL PLATE MOLD, 90' centers, 30" belt, w/drive.
2—STEEL PLATE MOLD, 90' centers, 24" belt, w/drive.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.
FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES—SEND REQUIREMENTS

CUPOLAS
1—WHITING, #4.
2—WHITING #6, Complete with Skip Charger.
1—MORRIS #9, w/skip, mixing ladle, never used.
1—WHITING #5, w/Blower & Air weight Control.
1—MODERN, #3, 46' shell, w/blower.
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CORE BLOWERS
1—CB-400 CHAMPION. 1—3K DEMMLER.
1—#55 DEMMLER. 1—#92 OSBORN.
1—FEDERAL, San-Bio.
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2—3000# HEROULTS.
1—2 Ton HEROULT.
1—6 Ton HEROULT.
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3—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—750# LFY DETROIT.
2—800# BAILEYS.
1—60# DETROIT, complete.

FURNACES—INDUCTION MELTING
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1—25 KW AJAX HIGH FREQUENCY M. G. SET with CONTROLS, 50# CAP.
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1—30 KW LEPEL, 5# crucible.
1—3 KW AJAX, Lab. type.

FURNACES—OIL AND GAS
1—FISHER 4 Burner MNP, 1700#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—SKLENAR 600#, Oil fired.
7—HAUSFELD 1000#, tilting, oil fired.
1—HAUSFELD Tilting, 1200# Mag.
1—R & S Convection Draw, Car bottom, 18' l x 8' w x 5' h, oil fired, dismantled, controls.

LADLES & POURING DEVICES
2—WHITING 3 Ton, Bottom pour.
4—10 TON BOTTOM POUR, 55" x 55".
2—45 TON TREADWELL, Excellent.
1—20 Ton lip Pour, 72" x 72".
1—SWINDELL, Elec. Holding.

MOLDING MACHINES
1—SHELL-O-MATIC Shell Molding Machine.

Jolt Rollovers
1—J & J #612, 24" x 30", 12" draw.
1—J & J #815, 30" x 40", 15" draw. 1200# jolt.
1—DAVENPORT #28SA, 28" x 40".
2—HERMAN 1500#, above ground.
2—HERMAN, 20" x 24", 750#.
1—HERMAN, 40" x 65", 3000#, short arm.
1—HERMAN, 40" x 59", 3000#, long arm.
1—HERMAN, 50" x 72", 6000# jolt.
1—HERMAN, 42" x 78", 6000# jolt.
1—HERMAN, 60" x 84".
1—OSBORN, #243, 27" x 40", 20" draw.
4—TABOR, 22" x 42", pattern draw. port.
1—SPO #506, 24" x 25", 10" draw.

Bumpers
1—OSBORN #102.
1—HERMAN, 60" x 72".

Jolt Strippers
9—DAVENPORT #30T, 30" x 30".
2—OSBORN #559, 25" x 30", 1200#.
4—MILWAUKEE #1536, 32" x 38".
4—SPO, 24" x 24".

Jolt Squeeze Strippers
1—OSBORN #175, 21" x 18", portable.
1—OSBORN #710J.
2—MILWAUKEE #163.

Jolt Squeezers
10—SPO 110J, Portable.
2—INTERNATIONAL, 17" x 20", port.
1—OSBORN #212 PJ, 17" x 23", stationary.
3—TABOR, 18" x 20", 3" jolt, column.
1—TABOR, 18" x 20", 3" jolt, cantilever.
1—ADAMS, 19" x 20", portable.

MULLERS AND MIXERS
2—SIMPSON #3, UNIT DRIVE.
1—SIMPSON #3, enclosed gears.
2—SIMPSON #2, Unit Drive.
2—CLEARFIELD #610 and #920.
1—BEARDSLEY & PIPER #60 SPEEDMULLER, 60 HP motor, SKIP-LOADER.
1—B & P #40 SPEEDMULLOR.

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1—TOWER CORE OVEN, 14" x 60" trays, 45' high, gas fired, dismantled.
2—ROSS 2 comp., rack, gas, 6½ x 14 x 7.
1—CRAWFORD, Gas Fired, 3 drawers.
1—HOTPOINT EDISON, ELECTRIC, 6 drawers, 30" x 40" x 8".
1—YOUNG BROS. 3 compartment, kiln type electrically heated, with CONTROLS.
1—YOUNG BROS. 2 compartment, drawer type, oil or gas, 82" h x 12' w x 6' l.

SAND CUTTERS
5—AMERICAN SAND CUTTERS.
1—MODEL "AA", 60" reel, Gas Driven.
1—MODEL "K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.

SAND LABORATORY EQUIPMENT
1—TEST CORE BAKING OVEN #606.

SAND PREPARATORS
2—B & P SCREENERATORS, size S & M.
1—REDDY SAND UNIT, HANDY SANDY.
2—JEFFREY SANDITIONERS, Portable.
2—ROYER SAND BLENDERS, 16" belt, 12" belt.
1—LINK BELT REVIVIFIER, Size 5.
2—B & P SAND CONDITIONERS, portable.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired #552.

SAND SLINGERS
1—BEARDSLEY & PIPER MOTIVE JR. 19" head.
1—BEARDSLEY & PIPER STATIONARY, 19" head, 8 ton plate feeder and hopper, NEVER USED.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head, magnetic separator.
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1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—ROCKWELL HARDNESS, #5JR with "C" Brail.
1—BALDWIN - TATE - EMERY, UNIVERSAL, Hydraulic tensile, 24,000#.

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15—PENN DUMP BUCKETS, 1000# to 4 ton.
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1—AMERICAN Rod Straightener and Shear.
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1—BLISS SPRUE CUTTER, 8" throat, 1½ HP.

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AIR COMPRESSORS

Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm synchronous motor, 350 CFM at 100#.

5 x 5 Ingersoll Rand 10 HP motor.

Ingersoll Rand Type 10, 800 CFM, XRB2, 16″ stroke 20″ x 12½″ cylinder, 2 stage compressor, 206 HP, 220 volt motor, with starter and air receiver. Complete. This unit was rebuilt in 1952 by Earl Knox Co.

Ingersoll Rand Type 10, 800 CFM, 2 stage air compressor, 200 HP, 220 V motor. This is an older unit. No starter or air receiver. Overhauled in 1951.

Sullivan Vertical Single Stage 100 HP air compressor, 220 volt motor, with starter and air receiver.

AIR HOISTS

8—4000# Ingersoll-Rand, with trolleys.

BLOWERS

Ingersoll-Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor.

General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.

Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.

CLEANING EQUIPMENT

Sly 8′ dia. Table Shot Blast Unit.

36 x 42 Halloway 7½ HP shot motor elevator and dust collector.

CORE BLOWERS

3—International SB 12.
4—International SB 13.
12—Osborn 193.
1—Osborn 2035-2.
1—Peterson (Similar to Demmler #50).
1—Champion CB 400.

CORE OVENS VERTICAL HORIZONTAL

1—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.

1—Coleman, combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min cycle. Present replacement cost over $90,000.

GRINDERS, SNAGGING

5—Hammond 10 W R I Double End Snag. Grinders 20″ dia. wheels, 10 HP 220/440 V motors, variable speed drives.

3″ x 24″ U.S. #65, 20 HP 220/440V.

GRINDERS, SWING FRAME

2—3″ x 24″ x 12″ Fox #4, 15 HP.
1—3″ x 24″ x 12″ Marschke, 20 HP.
1—3″ x 24″ x 12″ U.S. 15 HP.

HOT METAL CARRIER SYSTEM

3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

MOLDING MACHINES

Jolt Squeezers:

7—Milwaukee 103-11 Staty. Jolt Squeezers, 13½″ x 20″ table.
7—Champion JS10P Portable Jolt Squeeze molding machine. 18″ x 21″ table.
8—Osborn 275J.
1—Spo 110J.

Jolt Squeeze Pin Lifts BIG ONES:

2—International PK 20's. 20″ squeeze cylinder 8″ draw. Ser. #67237. New 1949.
1—Osborn 712 PJ. Stationary Jolt Squeeze pin lift 18″ x 28″ table 12″ squeeze cylinder, 6″ draw.
2—Milwaukee Jolt Squeeze Strippers, Model 163-50, 15″ x 24″ table 16″ X open end pattern size.
1—SPO 214 Jolt Squeeze Pin Lift.
2—Milwaukee 126-3 Jolt Squeeze Pin Stripper, 27″ x 21″ table, 8″ draw. Portable.

ROLLOVERS

Jolt Rollover Pattern Draw

1—Herman 4000# Series 30″ x 60″ table, 32″ x 48″ bumper.
1—Herman 3000# Series 40″ x 84″ table, special slotted table.
1—Herman 1500# Series 20″ x 36″ table.
2—Herman 750# Series 20″ x 30″ table.
2—Herman 750# Series 20″ x 24″ table.
All the above have air clamps rollout tables.
2—Champion JM-18-8 Jolt Rollovers, portable 13½″ x 20″ tables.
1—Davenport 24 SA Jolt Rollover Pattern Draw. 26″ x 42″ flask size, 12″ draw.
3—Spo Model 9032.
1—Milwaukee 217.

Jolt Pin Lifts:

Pin Lift Pushoffs:
2—Champion Pin Pushoffs 28″ x 42″ table 10″ draw.

MULLERS AND MIXERS

1—Link Belt Single Screw Sand Mixer.
Simpson #3 Type H open gear type.
Simpson #3 Muller with bucket loader.
Simpson #3 Open Gear type $1000.
Beardsley & Piper #70 Speedmuller, New style cross head.

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Porbeck Double Car Single door 16′ long 14′ wide 9′ high gas fired 600° recirculating complete with 7½ HP car puller, in place St. Louis, Mo.

Core Oven Electric 68″ x 42″ high, 65″ deep 100°-650°

POURING DEVICES

3—Pouring devices, Whiting 500#.

PREPARATOR

B&P #70 Preparator. Only used 3 months.

SAND CUTTERS

2—Royer Jr's.
2—Model M Screenarators.

SHAKEOUTS

Link Belt 3 x 5.

WIRE STRAIGHTENERS

Climax #3 Wire Straightener ¼″ to ¾″ dia. wire. 2 HP.

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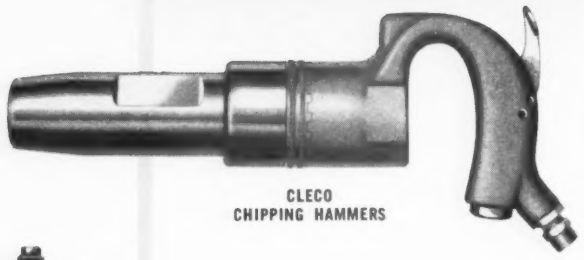

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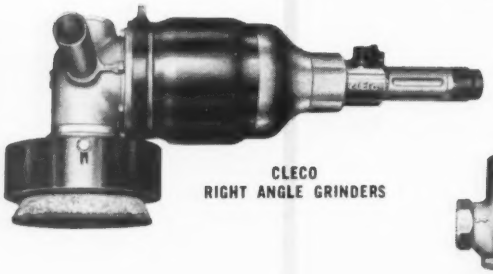

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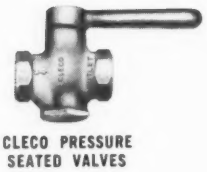

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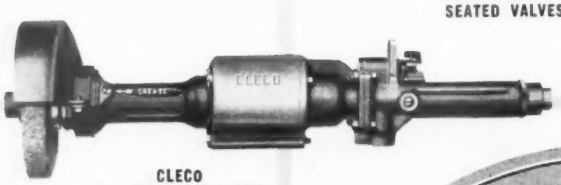

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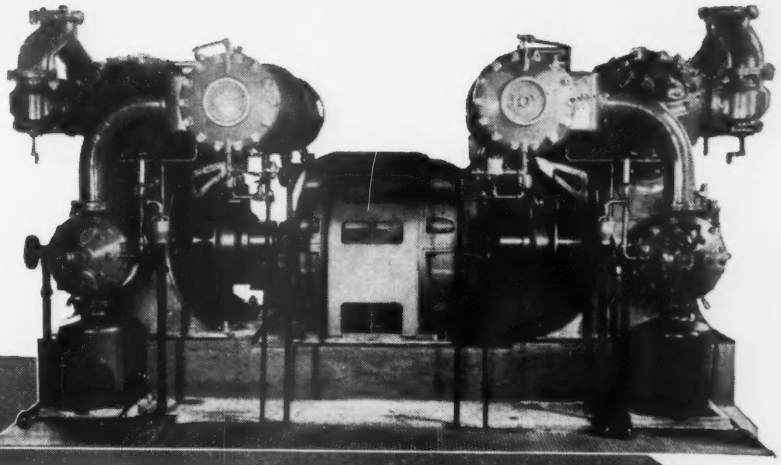
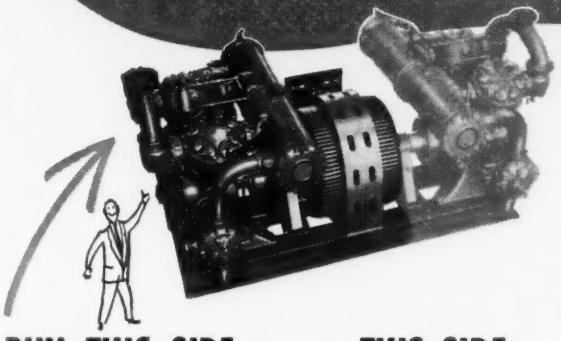
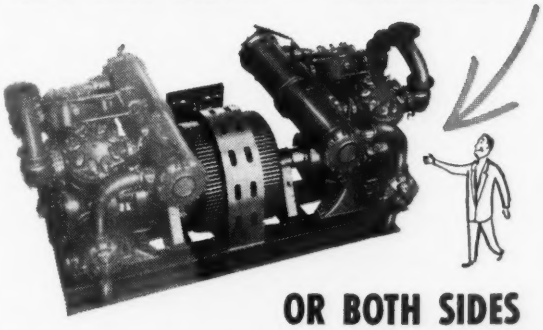


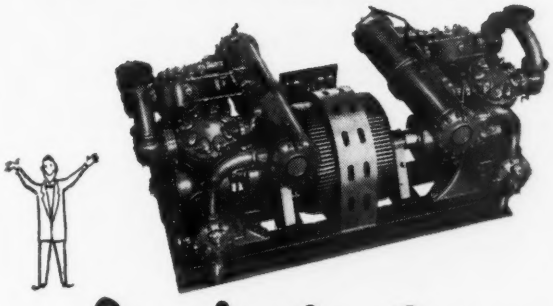
The JOY WN-114 TWIN is a 2-in-1 COMPRESSOR



RUN THIS SIDE... ...THIS SIDE



OR BOTH SIDES



SAVES FLOOR SPACE The Joy WN-114 Twin is actually two heavy duty, semi-radial compressors operating from a single motor. Because of the compact design and one power source, they make the most of limited floor space. The package-type units are delivered ready for mounting on a simple rectangular foundation.

USE ONLY WHAT YOU NEED Either compressor may be run alone by simply disconnecting its twin at the flexible coupling. As demand rises, the twin can be reconnected quickly, easily. This exceptional flexibility is ideal for plants where airpower demands vary greatly.

STANDBY INSURANCE The twin arrangement guarantees an "ace in the hole." When a conventional single compressor breaks down, its production stops completely. Under like circumstances, the Joy Twin continues at 50% capacity.

SAVES MAINTENANCE, OPERATING COSTS The WN-114 Twin is equipped with field-replaceable crosshead and cylinder liners and one-piece, box-type, tinned crossheads that require no adjustment. Patented "Dual Cushion" valves feature large area and low lift to give long, efficient, quiet operation. Displacement range is from 2372 to 3896.

For complete details on Joy WN-114 Twin Compressors, see your Joy representative, or write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

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VACUUM PUMPS AND BOOSTERS
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JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

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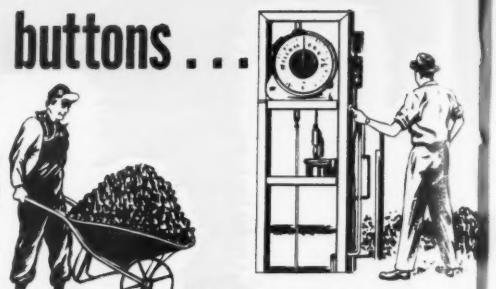
OR, push wheelbarrows . . .

BUT the results are different!



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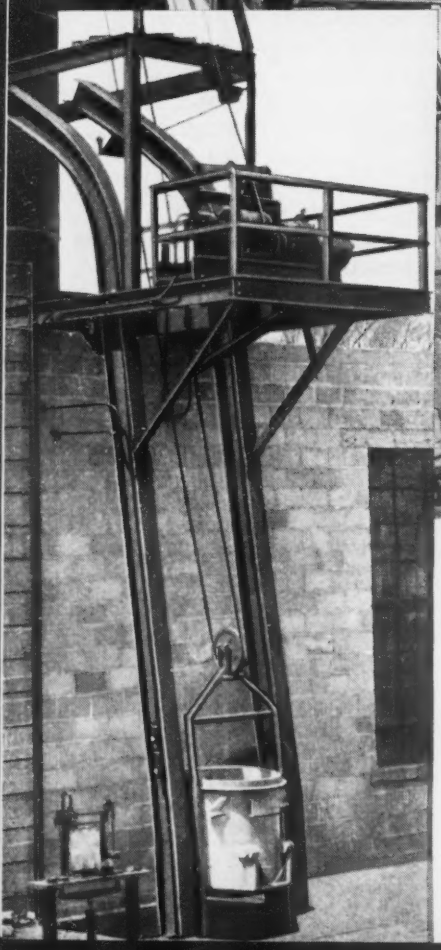

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Now with *Stevens Ignicoat* you can eliminate long torch drying of molds. You can eliminate drying ovens. Yes, with Stevens Ignicoat the expense, maintenance and fuel of tunnel ovens or banks of drying torches is no longer necessary.

Ignicoat, the new and different mold spray for the foundry, is a graphite coating, so formulated that it is easier to handle out of the drum and easier to mix than either a powder or a paste. And it is not dusty. It can be sprayed, brushed or swabbed. It produces a smooth casting surface and greatly aids peel of sand from castings.

Ignicoat mixes rapidly with isopropyl alcohol and contains the proper percentage of binder to insure good film adherence to the sand.

When it is sprayed on a green sand mold in the proper amount, it will show both penetration and surface coverage. After being ignited it will burn, with a gentle flame, from 10 to 40 seconds, depending on the amount used. Molds may then be closed and poured. The coating will not draw moisture.

Send for a trial order today. Write to Frederic B. Stevens, Inc., Detroit 16, Michigan.

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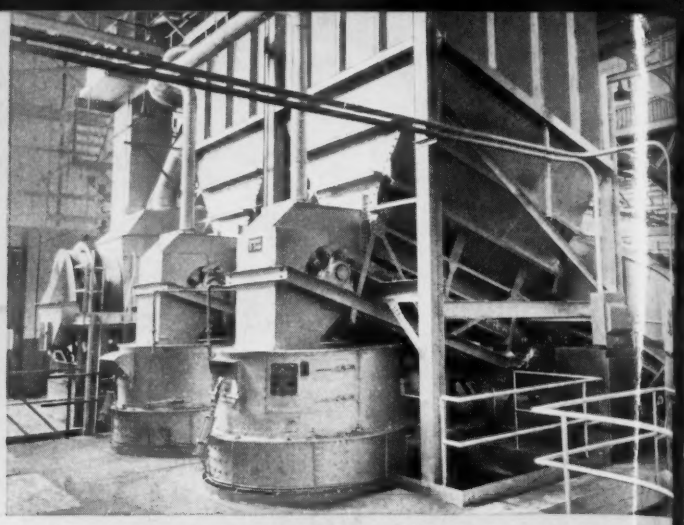
Sand Preparation Plant Showing Storage Bins, Weigh Hopper and Muller.



Compact Sand Preparation Plant in Large Mid-Western Gray Iron Foundry.

Sand Preparation Systems

engineered for YOUR exact requirements

Bartlett-Snow systems assure unvarying uniformity of sand quality — more molds per day — better castings — less scrap — increased production — lower costs.

● Complete facilities include collection of shakeout and strike-off sand — cooling — screening — adequate storage — mixing — aeration and return to molders. Fixed responsibility assures highly efficient synchronized operation of the entire system as a unit. Rugged construction assures low maintenance and low operating costs. Many steel, malleable, gray iron and non-ferrous installations.

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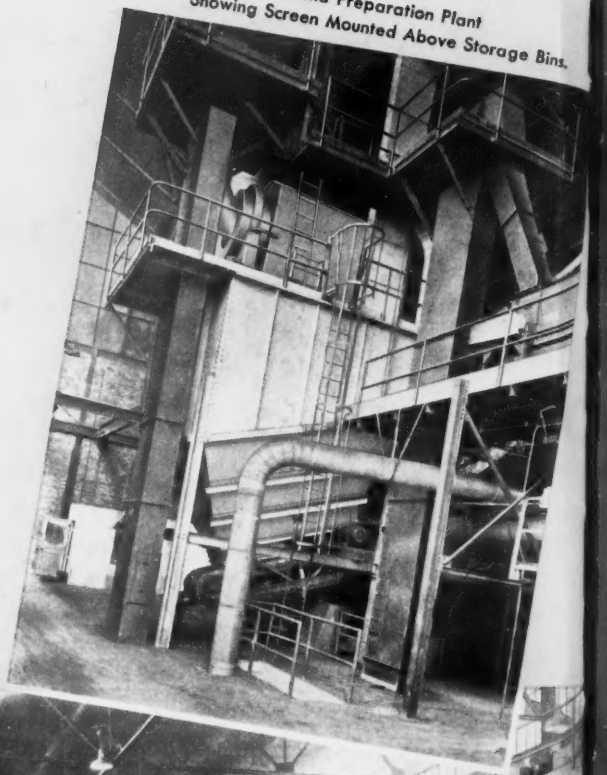
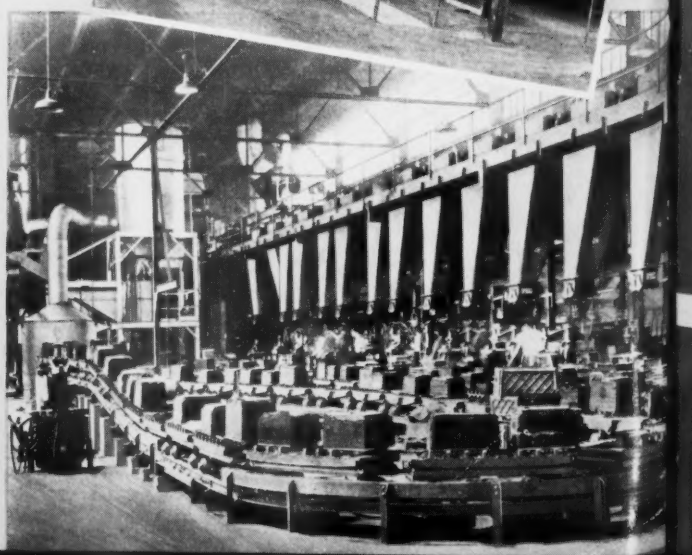
Sand Preparation Plant
Showing Screen Mounted Above Storage Bins.





Below—Left: Overhead Return of Prepared Sand to Molders. Below—Right: General View of Large Jobbing Foundry Showing Sand Plant, Molders Hoppers and Mold Conveyor.